

Pectinoidea (Mollusca: Bivalvia: Propeamussiidae: Pectinidae) of Lord Howe Island, Norfolk Island and the Kermadec Islands

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Abstract

Twenty-four pectinoidean species are recorded from Lord Howe Island (7 species), Norfolk Island (13 species) and the Kermadec Islands (14 species). Eighteen species are new records, and these are compared with similar species from the Australasian region. The following taxa are newly synonymised: *Annachlamys leopardus rena* Iredale, 1939 (= *A. kuhnholzii* (Bernardi, 1860)), *Chlamys cellularis* Oliver, 1915 (= *C. c. coruscans* (Hinds, 1845)), *Chlamys (Mimachlamys) asperrimoides* Powell, 1958 (= *M. senatoria* (Gmelin, 1791)). *Chlamydella favus lemchei* Powell, 1958 is considered to be specifically distinct from *Cyclopecten favus* Hedley, 1902, and is referred to *Cyclochlamys* Finlay, 1926. Lectotypes are for the following species designated: *Hemipecten forbesianus* A. Adams & Reeve, 1849, *Ostrea senatoria* Gmelin, 1791, and *Ostrea porphyrea* Gmelin, 1791.

Key words: Pectinoidea, Propeamussiidae, Pectinidae, Lord Howe Island, Norfolk Island, Kermadec Islands.

Introduction

In his monograph on the molluscan fauna of the Kermadec Islands Oliver (1915) recorded three Pectinoidea, of which one was new for science (*Chlamys cellularis*). Subsequently, Powell (1958) introduced four additional species obtained by the "Galathea" Expedition (1952) from off the Kermadec Islands and Norfolk Island.

Twenty-four pectinoideans are here recorded from the study region: Lord Howe Island (7 pectinids), Norfolk Island (5 propeamussiids and 8 pectinids), Kermadec Islands (9 propeamussiids and 5 pectinids). Of these, 5 are new records for Lord Howe Island, 9 for Norfolk Island, and 8 for the Kermadec Islands.

The following abbreviations are used: AIM, Auckland Institute and Museum; AMS, The Australian Museum, Sydney; BMNH, The Natural History Museum, London; CM, Canterbury Museum, Christchurch; IOAS, Institute of Oceanology, Academia Sinica, Qingdao; MNHB, Museum für Naturkunde der Humboldt-Universität, Berlin; MNHN, Muséum National d'Histoire Naturelle, Paris; NMNZ, Museum of New Zealand, Wellington; NZOI, National Institute of Water and Atmospheric Research, Wellington; OUZM, Oxford University Zoology Museum, Oxford; QVM, Queen Victoria

Museum and Art Gallery, Launceston; SAM, South Australian Museum, Adelaide; SMNH, Swedish Museum of Natural History, Stockholm; USNM, National Museum of Natural History, Washington D.C.; WAM, Western Australian Museum, Perth; ZMA, Zoölogisch Museum, Amsterdam; ZMUC, Zoologisk Museum, Copenhagen; ZSI, Zoological Survey of India, Calcutta; lv, left valve(s); rv, right valve(s); v, valve(s); pr, conjoining valves.

Systematics

Superfamily Pectinoidea Wilkes, 1810

Family Propeamussiidae Abbott, 1954

Genus *Propeamussium* de Gregorio, 1884

Propeamussium de Gregorio, 1884: 119. Type species (by original designation): *Pecten* (*Propeamussium*) *ceciliae* de Gregorio, 1884; Miocene, Sicily, Italy.

Paramusium Verrill, 1897: 72. Type species (by original designation): *Amussium dalli* E. A. Smith, 1885; Recent, W Atlantic.

Occultamussium Korobkov, 1937: 56. Type species (by original designation): *Pecten semiradiatus* Mayer, 1861; Upper Eocene, Tirol, Austria.

Pseudopalliorum Oyama, 1944: 244. Type species (by original designation): *Pecten interradiatus* Gabb, 1869; Eocene, California, U.S.A.

Bathymussium Oyama, 1951: 79. Type species (by original designation): *Amussium jeffreysii* E. A. Smith, 1885; Recent, N Sulu Sea, Philippines.

Micramussium Oyama, 1951: 50. Type species (by original designation): *Ctenamusium* (*Micramussium*) *siratama* Oyama, 1951; Recent, Sagami Sea, Japan.

Flavamussium Oyama, 1951: 81. Type species (by original designation): *Amussium caducum* E. A. Smith, 1885; Recent, W of Luzon, Philippines.

Luteamussium Oyama, 1951: 82. Type species (by original designation): *Amussium sibogai* Dautzenberg & Bavay, 1904; Recent, Bali Sea, Indonesia.

Propeamussium alcocki (E. A. Smith, 1894)

Plate 1, figs. 1–6

Amussium alcocki E. A. Smith, 1894: 172, pl. 5, figs. 15–16; Alcock & Anderson, 1897: pl. 2, figs. 3, 3a; Alcock, 1902: 282, fig. 79; E. A. Smith, 1906: 255; Thiele & Jaeckel, 1931: 8; Winckworth, 1940: 26.

Propeamussium alcocki (E. A. Smith). Abbott & Dance, 1982: 303, fig.; Dijkstra, 1995: 5, figs. 1–4, 133–137.

Type data: Lectotype (Dijkstra, 1995) ZSI 6154/9; 3 paralectotypes, BMNH 94.9.11.1, NMW 1955.158.785, ZMUC, "Investigator" stn 105, 15°02'N, 72°34'E, Laccadive Sea, alive, 1353 m.

Other material examined: NORFOLK ISLAND: P15, 30°10.7'S, 167°44.2'E, 952–949 m (NZOI, 1 pr).

Distribution: Northern Indian Ocean, Coral Sea, New Caledonia, Loyalty Islands, and Norfolk Island; 650–1469 m, living at 760–1353 m.

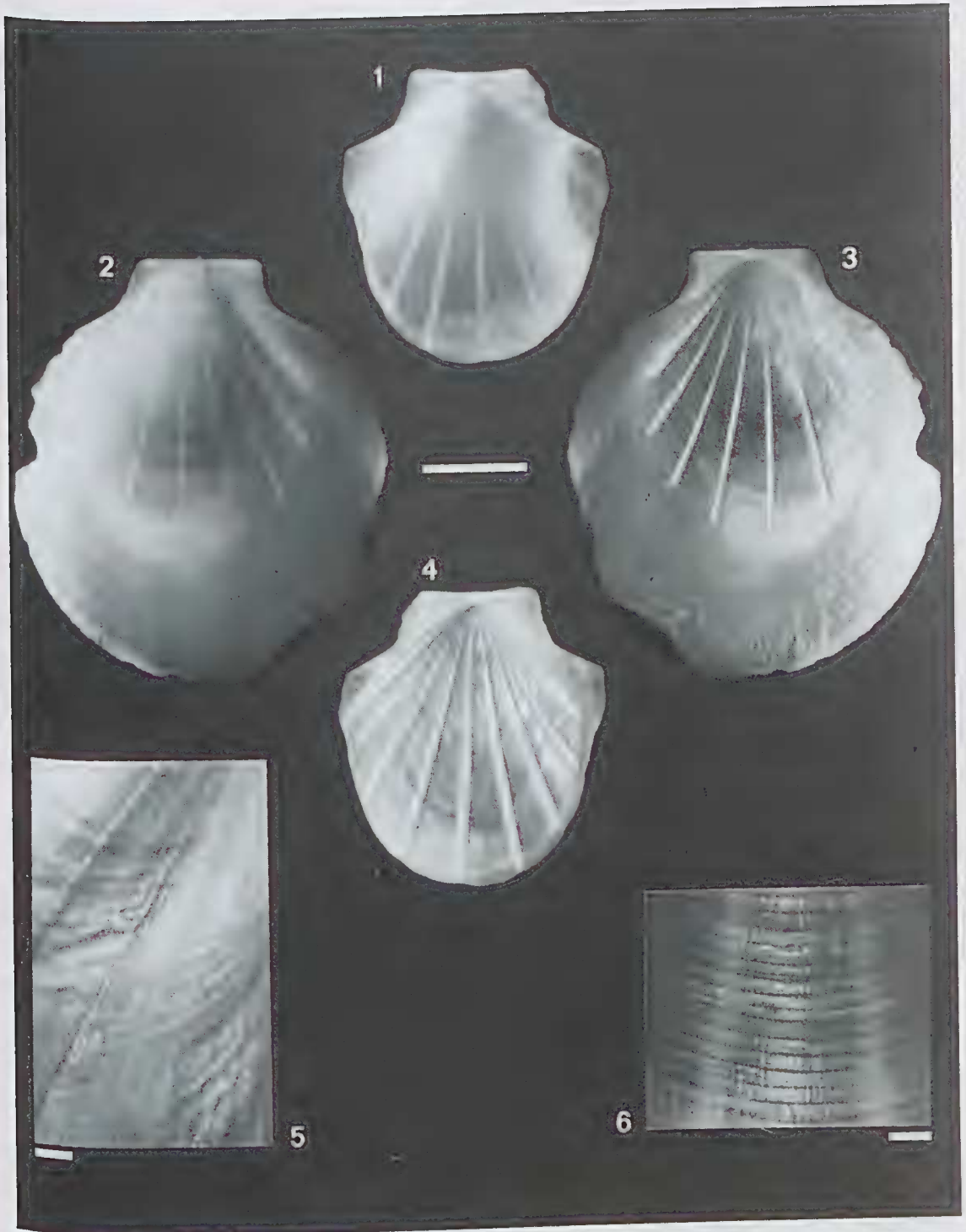
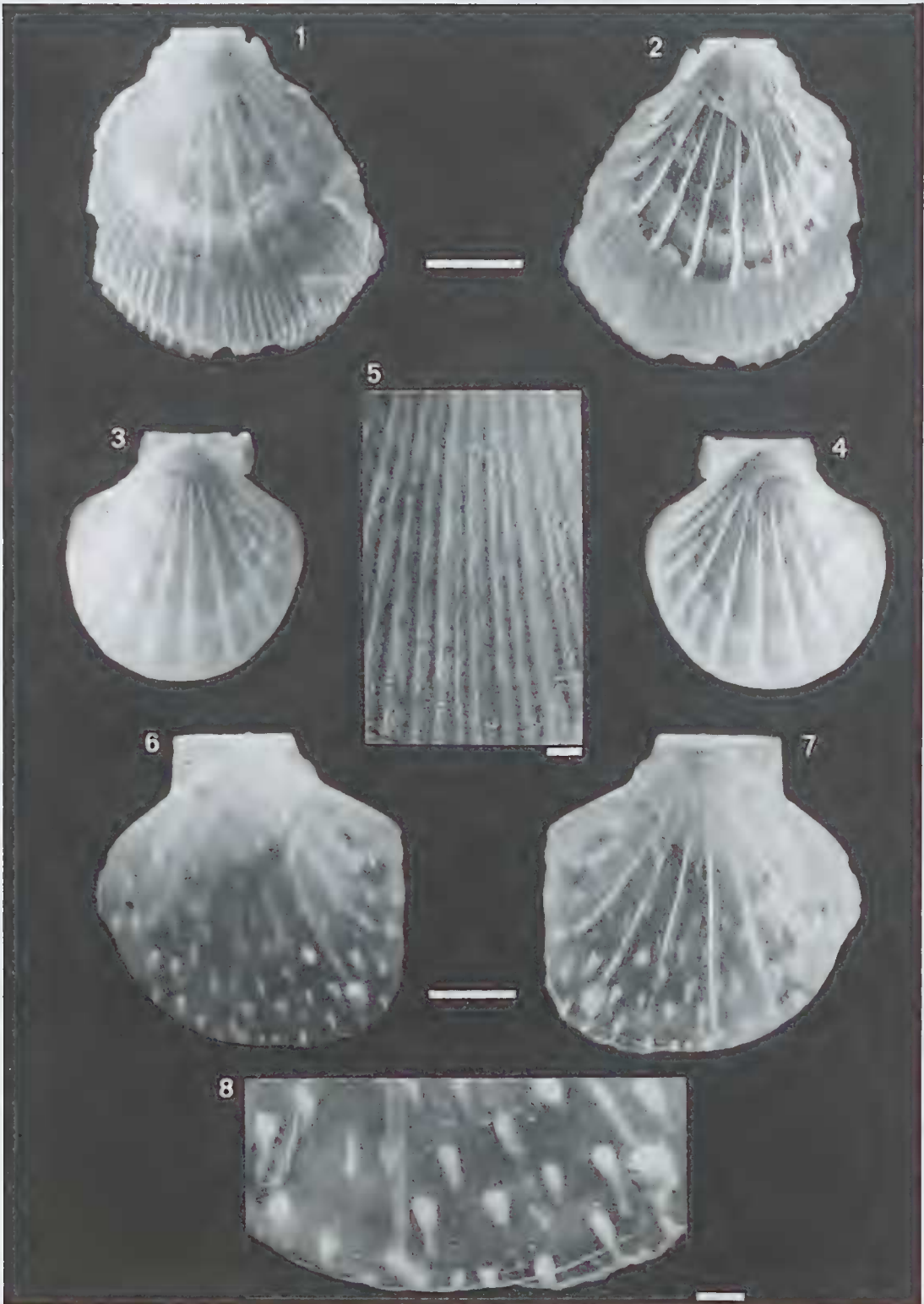


Plate 1. Figures 1-6. *Propeamussium alcocki* (E.A. Smith, 1894), Norfolk Island, 949-952 m, NZOI. Figs. 1-4 (scale = 10 mm), figs. 5-6 (scale = 1 mm). Fig. 1. Right valve, exterior. Fig. 2. Left valve, exterior. Fig. 3. Left valve, interior. Fig. 4. Right valve, interior. Fig. 5. Left valve, exterior, postero-marginal area. Fig. 6. Right valve, exterior, central area.



Remarks: The present specimen is similar to the type material. Immature specimens lack the close-spaced concentric lamellae near the ventral margin of the left valve. *Propeamussium watsoni* (E. A. Smith, 1885) is somewhat similar to *P. alcocki*, and differs from the present species by having a more orbicular shape, concentric and radial sculpture on left valve (*P. alcocki* smooth or concentric growth lines), and more prominent concentric lamellae on the right valve.

Propeamussium maorium (Dell, 1956)

Plate 2, figs. 1–5

Parvamussium maorium Dell, 1956: 20, figs. 30–31; Powell, 1979: 381, figs. 93.1–2; Rombouts, 1991: 69.

Parvamussium maorum [sic] Dell, 1962: 75; 1963: 206.

Propeamussium maorium (Dell). Dijkstra, 1995: 10, figs. 11–14.

Type data: Holotype, NMNZ M.9171, "Alert" stn 54–17, Canyon A, ENE of Taiaroa Head, New Zealand, 476–640 m.

Other material examined: NORFOLK ISLAND: AUZ021, 28°53'S, 168°07'E, NE of Norfolk I., 732–567 m, R.N.Z.F.A. "Tui" (NMNZ M.224633, 1 v). KERMADEC ISLANDS: NMNZ stn BS442, 29°16.5'S, 177°49.5'W, SE of Chanter Is., Raoul I., alive, 512–549 m, R.V. "Acheron" (NMNZ M.225611, 6 pr & 12 v).

Distribution: Coral Sea, Loyalty Islands, Norfolk Island, Kermadec Islands, and New Zealand; 476–732 m, living at 512–549 m.

Remarks: *Propeamussium maorium* is most similar to *P. investigatoris* (E. A. Smith, 1906) from the southeastern Arabian Sea, but differs by having the left valve entirely smooth instead of sculptured with radial and concentric striae on the early part. Moreover, the radial costae are somewhat more prominent in *P. maorium*. Another similar species is *Propeamussium jeffreysii* (E. A. Smith, 1885) from the Philippines, which differs by having fine, somewhat cancellate sculpture on the left valve from the umbo to the central part of the disc, and in that some mature specimens have concentric lamellae near the periphery. We are unable to distinguish specimens from the Kermadecs and Norfolk Island from the type and other New Zealand specimens of *P. maorium*.

Propeamussium rubrotinctum (Oyama, 1951)

Plate 2, figs. 6–8

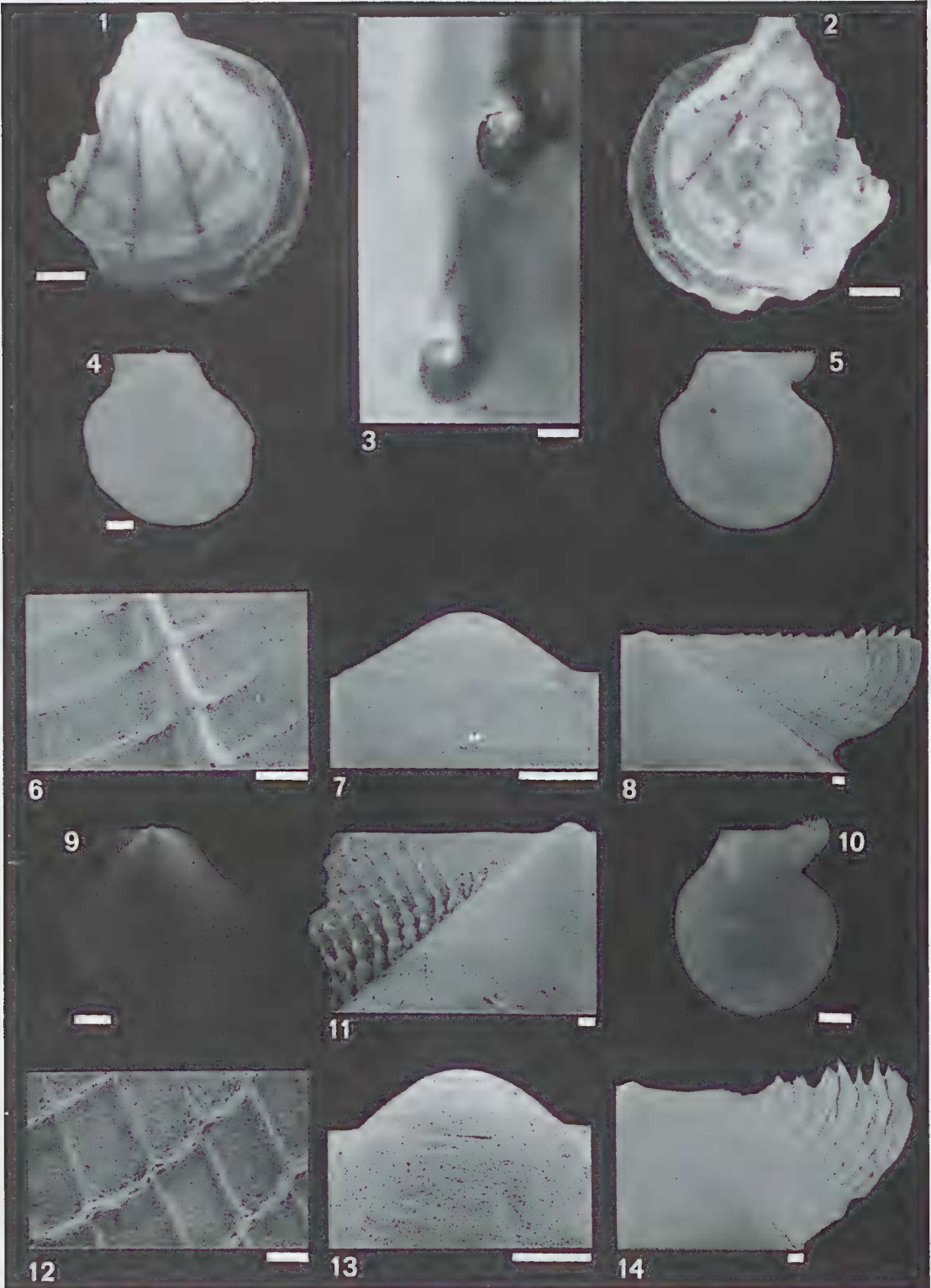
Parvamussium (*Parvamussium*) *rubrotinctum* Oyama, 1951: 81, pl. 13, figs. 8–10.

Propeamussium (*Propeamussium*) *stella* Wang, 1984: 600, 602, pl. 1, figs. 11–14.

Propeamussium rubrotinctum (Oyama). Hayami, 1988a: 80; Dijkstra, 1995: 13, figs. 23–26.

Type data: *Propeamussium rubrotinctum*: Type material probably in the private collection of Dr K. Oyama at Toba, Japan (I. Hayami, pers. comm.). *Propeamussium stella*: Holotype IOAS M25778; paratype, IOAS M25779, South China Sea, 19°00'N, 112°05'E, 290 m.

Plate 2. Figures 1–5. *Propeamussium maorium* (Dell, 1956), Kermadec Islands, 512–549 m, NMNZ M.225611. Figs. 1–4 (scale = 5 mm), fig. 5 (scale = 1 mm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, interior. Fig. 3. Right valve, exterior. Fig. 4. Right valve, interior. Fig. 5. Left valve, exterior, ventral area. Figures 6–8. *Propeamussium rubrotinctum* (Oyama, 1951), Norfolk Island, 280–350 m, NZOI. Figs. 6–7 (scale = 5 mm), fig. 8 (scale = 1 mm). Fig. 6. Left valve, exterior. Fig. 7. Left valve, interior. Fig. 8. Left valve, exterior, ventral area.



Other material examined: NORFOLK ISLAND: I86, 29°29.9'–29°29.7'S, 167°50.5'–167°50.4'E, 280–350 m (NZOI, 6 v).

Distribution: Southern Japan, South China Sea, New Caledonia, Loyalty Islands, and Norfolk Island; 280–610 m, living at 380–490 m.

Remarks: *Propeamussium steindachneri* (Sturany, 1901) from the Red Sea and the Gulf of Oman is somewhat similar to *P. rubrotinctum*, but attains a smaller size (approximately 14mm instead of 20mm) and has fewer internal costae (8 instead of 10). Shell characters of *P. stella* Wang, 1984 from the South China Sea and of the present species are identical, although the coloration is somewhat different (orange instead of white maculations).

Propeamussium sibogai (Dautzenberg & Bavay, 1904)

Plate 3, figs. 1–3

Amussium sibogai Dautzenberg & Bavay, 1904: 207–211, figs. 1–4; 1912: 31, pl. 28, figs. 1–4.

Luteamussium sibogai (Dautzenberg & Bavay). Oyama, 1951: 82, text fig. 1; Kira, 1962: 138, pl. 49, fig. 14.

Propeamussium sibogai (Dautzenberg & Bavay). Knudsen, 1967: 272–273, pl. 1, figs. 23–24; Abbott & Dance, 1982: 303, fig.; Wang, 1984: 599, text fig. 1, figs. 1–2; Hayami, 1988: 479, 480, figs. 2.4a–d; Okutani, Tagawa & Horikawa, 1989: 59, fig.; Dijkstra, 1990a: 9; 1995: 15, figs. 19–22; Rombouts, 1991: 66, pl. 27, figs. 1–1a; Lamprell & Whitehead, 1992: text unpag, pl. 6, fig. 34.

Amussium cf. *sibogai* (Dautzenberg & Bavay). Barnard, 1969: 655, pl. 1, figs. a–d.

Propeamussium (*Luteamussium*) *sibogai* (Dautzenberg & Bavay). Koyama, Yamamoto, Toki & Minato, 1981: 62.

Luteamussium sibogae [sic] (Dautzenberg & Bavay). Kosuge, 1985: 59, pl. 23, fig. 12.

Type data: Holotype ZMA Moll. 3.04.001, “Siboga” stn 12, 7°15'S, 115°15.6'E, Bali Sea, Indonesia, alive, 289 m.

Other material examined: KERMADEC ISLANDS: AUZ114, off Curtis I., c. 300 m, R.N.Z.F.A. “Tui” (NMNZ M.223545, 1 v); P948, 24°17.70'S, 178°50.10'W, 589 m (NZOI, 1 valve).

Distribution: South Africa, Japan, Philippines, Indonesia, Timor Sea, New Caledonia and Loyalty Islands, and Kermadec Islands; 183–710 m, living at 430–575 m.

Remarks: The present specimens resemble the type specimen of *P. sibogai*, but differ by being semi-transparent with fewer yellowish radial stripes, and by having smaller brownish internal costae.

Plate 3. Figures 1–3. *Propeamussium sibogai* (Dautzenberg & Bavay, 1904), Kermadec Islands, c. 300 m, NMNZ M.223545. Figs. 1–2 (scale = 10 mm), fig. 3 (scale = 1 mm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, interior. Fig. 3. Left valve, internal pustules. Figures 4–8. *Parvamussium cristatellum* (Dautzenberg & Bavay, 1912), Kermadec Islands, 256–348 m, NMNZ M.225398. Figs. 4–5 (scale = 1 mm), figs. 6–8 (scale = 100 µm). Fig. 4. Left valve, exterior. Fig. 5. Right valve, exterior. Fig. 6. Left valve, exterior, microsculpture, postero-ventral area. Fig. 7. Left valve, prodissoconch. Fig. 8. Right valve, exterior, anterior auricle. Figures 9–14. *Parvamussium retiaculum* Dijkstra, 1955, Norfolk Island, 538–545 m, NMNZ M.225311. Figs. 9–10 (scale = 1 mm), figs. 11–14 (scale = 100 µm). Fig. 9. Left valve, exterior. Fig. 10. Right valve, exterior. Fig. 11. Left valve, exterior, anterior auricle. Fig. 12. Left valve, exterior, microsculpture, postero-ventral area. Fig. 13. Left valve, prodissoconch. Fig. 14. Right valve, exterior, anterior auricle.

Genus *Parvamussium* Sacco, 1897

Parvamussium Sacco, 1897: 102. Type species (by original designation): *Pecten (Pleuronectes) duodecimlamellatus* Bronn, 1832; Upper Miocene, Tabbiano, northern Italy.

Variamussium Sacco, 1897: 102. Type species (by original designation): *Amussium cancellatum* E. A. Smith, 1885; Recent, off Bermuda, W Atlantic.

Ctenamussium Iredale, 1929: 164. Type species (by original designation): *Amussium thetidis* Hedley, 1902; Recent, off Port Kembla, New South Wales, Australia.

Glyptamussium Iredale, 1939: 370. Type species (by original designation): *Amussium torresi* E. A. Smith, 1885; Recent, E of Cape York, Queensland, Australia.

Squamamussium Oyama, 1944: 245. Type species (by original designation): *Amussium squamigerum* E. A. Smith, 1885; Recent, off E Puerto Rico, West Indies.

Polynemamussium Habe, 1951: 72. Type species (by original designation): *Pecten intuscostatus* Yokoyama, 1920; Pleistocene, Kami-Miyata, Miura City, Kanagawa Prefecture, Japan.

Remarks: As currently defined (Schein-Fatton, 1988; Schein, 1989; Hayami & Kase, 1993) *Parvamussium* differs from *Propeamussium* in having unequal instead of equal auricles, in lacking of disc gapes (anterior and posterior) and in having a well-developed byssal notch, while the internal costae commence at a late stage of growth. *Parvamussium* species attain smaller size than *Propeamussium* species (length 5–20 mm, and 15–85 mm respectively).

Parvamussium cristatellum (Dautzenberg & Bavay, 1912)

Plate 3, figs. 4–8. Plate 4, figs. 1–2

Pecten (Amussium) cristatum Bavay, 1905: 187, pl. 17, figs. 2a–c (not Bronn, 1831).

Amussium cristatellum Dautzenberg & Bavay, 1912: 36, pl. 28, figs. 5–8 (new name for *Pecten (Amussium) cristatum* Bavay, not Bronn).

Amussium texturatum (Dautzenberg & Bavay). Barnard, 1964: 432 (not *Amussium texturatum* Dautzenberg & Bavay, 1912).

Propeamussium (Parvamussium) cristatellum (Dautzenberg & Bavay). Dijkstra, 1990a: 9.

Parvamussium cristatellum (Dautzenberg & Bavay). Rombouts, 1991: 67.

Type data: 3 Syntypes ZSI M3360/1, "Masandam insulam" (Masandam Islands, Andaman Islands), depth unknown.

Other material examined: KERMADEC ISLANDS: BS439, 29°15.3'S, 177°49.3'W, E of Chanter Is., Raoul I., 256–348 m, R.V. "Acheron" (NMNZ M.225398, 49 v); BS441, 29°15.5'S, 177°50'W, E of Chanter Is., Raoul I., 366–402 m, R.V. "Acheron" (NMNZ M.225529, 30 v); BS442, 29°16.5'S, 177°49.5'W, SE of Chanter Is., Raoul I., 512–549 m, R.V. "Acheron" (NMNZ M.225616, 1 v).

Distribution: Southeastern Africa, Andaman Islands, Indonesian Archipelago and Kermadec Islands, 74–549 m, living at 510 m.

Remarks: The present specimens differ slightly from the type material in having more prominent concentric lamellae on the left valve, and weaker, irregularly spaced radial costae.

A closely similar species is *Parvamussium thetidis* (Hedley, 1902) from southern Australia, which differs in having more closely spaced concentric lamellae on the left valve, weaker radial costae, and stronger internal costae, which commence at an earlier stage of growth.

Parvamussium siebenrocki (Sturany, 1901) from the northwestern Indian Ocean is also closely

similar to *P. cristatellum*, but slightly differs in sculpture (less prominent) on the left valve and internal ribbing (more rudimentary intercostal ribs). It might be a senior synonym of the present species, as already suggested by Dijkstra (1991: 14). *Parvamussium formosum* (Melvill in Melvill & Standen, 1907) also from the northwestern Indian Ocean differs from *P. cristatellum* in having a very weak sculpture on the left valve (to nearly smooth) and some more internal costae.

South African specimens identified as *Parvamussium texturatum* by Barnard (1964), are indistinguishable from the type material and other specimens of *P. cristatellum*.

Parvamussium retiaculum Dijkstra, 1995

Plate 3, figs. 9–14. Plate 4, figs. 3–4

Parvamussium retiaculum Dijkstra, 1995: 20, figs. 35–38.

Type data: Holotype MNHN, BIOCAL stn DW51, 23°05'S, 167°45'E, southern New Caledonia, alive, 680–700 m.

Other material examined: NORFOLK ISLAND: AUZ 09, 30°46'S, 173°50'E, Kiwi Seamount, northern Three Kings Rise, 538–545 m, R.N.Z.F.A. "Tui" (NMNZ M.225311, 5 v). KERMADEC ISLANDS: BS442, 29°16.5'S, 177°49.5'W, SE of Chanter Is., Raoul I., 512–549 m, R.V. "Acheron" (NMNZ M.225615, 1 v).

Distribution: Southern New Caledonia, SE of Norfolk Island and off Raoul Island, Kermadec Islands; 512–775 m, living at 680–700 m.

Remarks: The present material is similar to the type specimens of *P. retiaculum* from southern New Caledonia, although one specimen has slightly more closely spaced concentric lamellae on the left valve. *P. retiaculum* somewhat resembles *Parvamussium multiliratum* Dijkstra, 1995 from southern New Caledonia, but is less orbicular in shape with larger auricles, and has fewer internal costae that are more irregular in size.

Parvamussium squalidulum Dijkstra, 1995

Plate 4, figs. 5–10

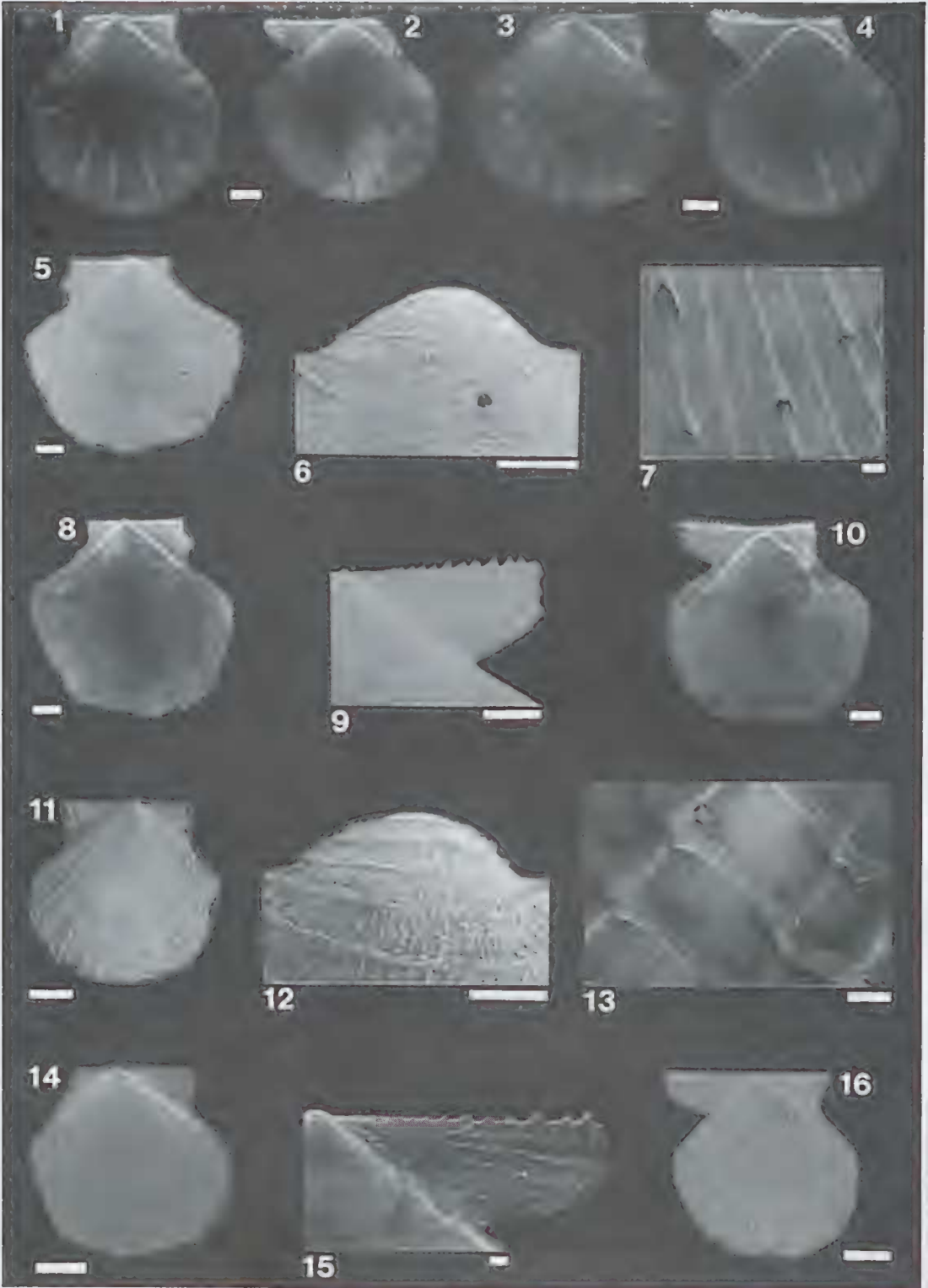
Parvamussium squalidulum Dijkstra, 1995: 24, figs. 47–50.

Type data: Holotype, MNHN, MUSORSTOM 5 stn DW277, 24°11'S, 159°35'E, Kelso Banc, Coral Sea, alive, 270 m.

Other material examined: KERMADEC ISLANDS: K825, 28°47.8'S, 177°47.8'W, 145 m (NZOI, 12 v); BS438, 29°14.7'S, 177°49.4'W, SE of Nugent I., Raoul I., 146–165 m, R.V. "Acheron" (NMNZ M.225679, 1 v); AUZ113, off Curtis I., alive, 302 m, R.N.Z.F.A. "Tui" (NMNZ M.224639, 1 pr + 3 v).

Distribution: Coral Sea, Loyalty Islands, Vanuatu, and Kermadec Islands; 146–610 m, living at 260–400 m.

Remarks: The Kermadec specimens are similar to the type material. The internal costae (6–12) are very variable in number and are irregularly distributed. A closely similar species is *Parvamussium sinense* (Wang, 1980) from the East China Sea, which has stronger, more closely spaced squamous radial costae on the left valve. It also has delicate concentric lamellae on the right valve, which are usually absent in *P. squalidulum*.



Parvamussium vesiculatum Dijkstra, 1995

Plate 4, figs. 11–16

Parvamussium vesiculatum Dijkstra, 1995: 29, figs. 59–62, 93–96.

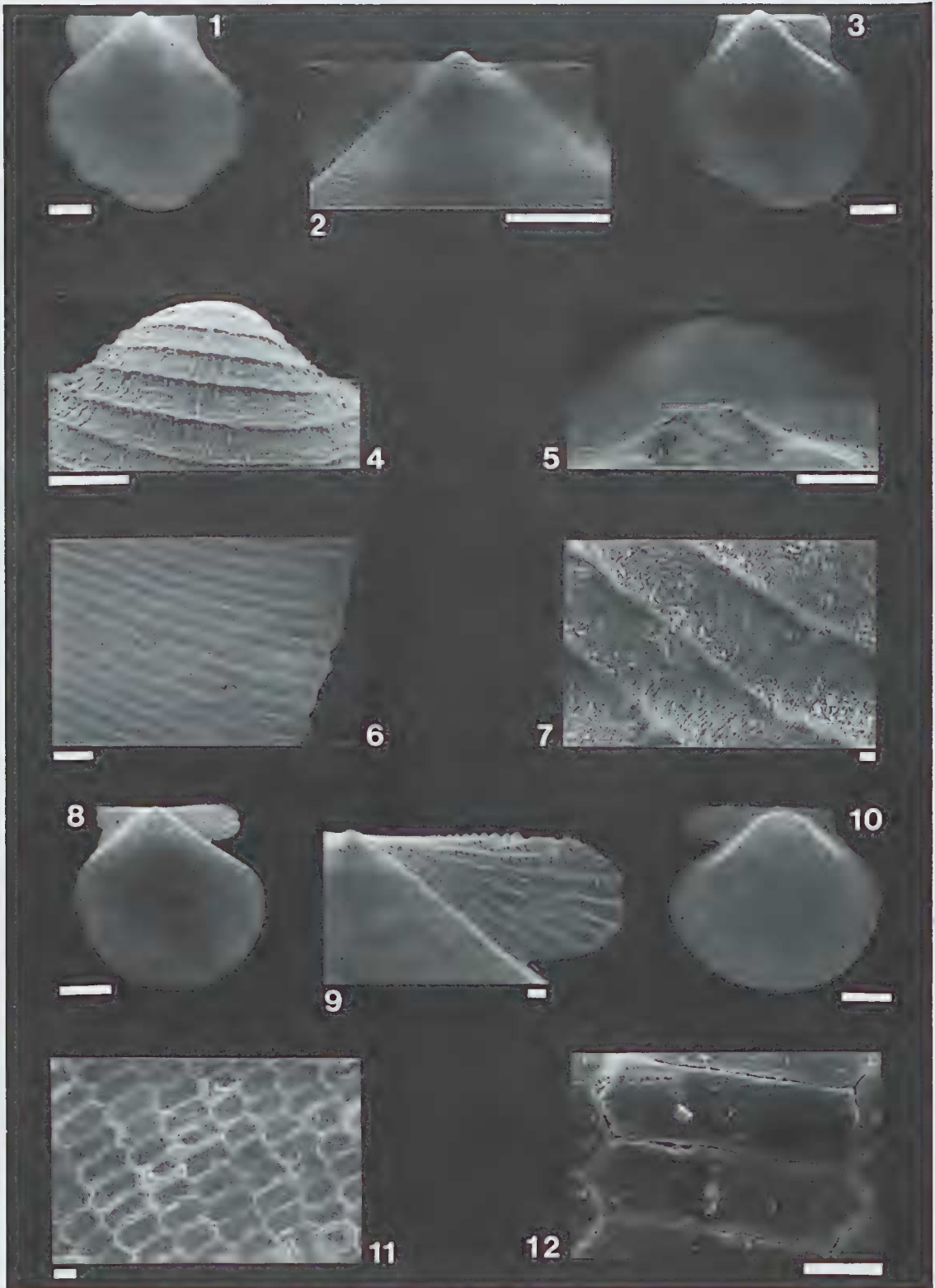
Type data: Holotype, MNHN, BIOCAL stn DW44, 22°47'S, 167°14'E, SE New Caledonia, alive, 440–450 m.

Other material examined: NORFOLK ISLAND: AUZ036, 20°19'S, 168°07'E, off Norfolk Island, 110 m, R.N.Z.F.A. "Tui" (NMNZ M.224962, 1 v); AUZ037, 20°20'S, 168°09'E, off Norfolk Island, 201 m, R.N.Z.F.A. "Tui" (NMNZ M.224723, 18 v); AUZ040, 29°24'S, 168°10'E, off Norfolk Island, 326 m, R.N.Z.F.A. "Tui" (NMNZ M.224809, 2 v). NORFOLK RIDGE: CHALCAL 2 stn DW76, 23°41'S, 167°45'E, 470 m (MNHN, 2 pr); SMIB 3 stn DW22, 23°03'S, 167°19'E, 503 m (MNHN, 7 lv).

Distribution: Western and southern New Caledonia, and Norfolk Ridge; 260–700 m, living at 260–650 m.

Remarks: *Parvamussium vesiculatum* is most similar to *P. texturatum* (Dautzenberg & Bavay, 1912) from the Sulu Sea, which is slightly more orbicular with somewhat larger auricles, while the radial costae on the left valve are more prominent, and the concentric lirae are weaker and more widely spaced. *P. vesiculatum* is ornamented with nodules on the concentric lirae, whereas *P. texturatum* has more numerous scales. There are also differences in the internal costae, which are rudimentary and fewer in number in the present species, and well developed in *P. texturatum*.Genus *Cycloclamys* Finlay, 1926*Cycloclamys* Finlay, 1926: 452. Type species (by original designation): *Pecten transenna* Suter, 1913; Recent, off The Snares, New Zealand.*Chlamydella* Iredale, 1929: 164, 188. Type species (by original designation): *Cyclopecten favus* Hedley, 1902; Recent, off New South Wales, Australia.Remarks: Hertlein (1969: N353) treated *Cycloclamys* Finlay, 1926 as a synonym of *Cyclopecten* Verrill, 1897 and considered the former genus as a nomen nullum (i.e. an unintentional alteration in spelling of *Cyclopecten*). Finlay (1926: 452), however, clearly differentiated *Cycloclamys* from *Cyclopecten*.*Chlamydella* Iredale, 1929 is a junior synonym of *Cycloclamys* (Maxwell, 1988: 44). Both have a somewhat triangular prodissoconch, and a hexagonal microsculpture on the right valve. See also Hayami & Kase (1993: 61).

Plate 4. Figures 1–2. *Parvamussium cristatellum*, NMNZ M.225398, scale = 1 mm (see also pl. 3, figs. 4–5). Fig. 1. Left valve, interior. Fig. 2. Right valve, interior. Figures 3–4. *Parvamussium reticulatum*, NMNZ M.225311, scale = 1 mm (see also pl. 3, figs. 9–10). Fig. 3. Left valve, interior. Fig. 4. Right valve, interior. Figures 5–10. *Parvamussium squalidulum* Dijkstra, 1995, Kermadec Islands, 302 m, NMNZ M.224639. Figs. 5, 8–10 (scale = 1 mm), figs. 6–7 (scale = 100 µm). Fig. 5. Left valve, exterior. Fig. 6. Left valve, prodissoconch. Fig. 7. Left valve, exterior, microsculpture, postero-ventral area. Fig. 8. Left valve, interior. Fig. 9. Right valve, exterior, anterior auricle. Fig. 10. Right valve, interior. Figures 11–16. *Parvamussium vesiculatum* Dijkstra, 1995, Norfolk Island, 201 m, NMNZ M.224723. Figs. 11, 14, 16 (scale = 1 mm), figs. 12, 13, 15 (scale = 100 µm). Fig. 11. Left valve, exterior. Fig. 12. Left valve, prodissoconch. Fig. 13. Left valve, exterior, microsculpture, antero-ventral area. Fig. 14. Left valve, interior. Fig. 15. Right valve, exterior, anterior auricle. Fig. 16. Right valve, interior.



Several Australasian and Antarctic propeamussiids currently grouped in *Cyclopecten*, actually belong in *Cycloclamys* (under study).

Cycloclamys lemchei (Powell, 1958) (**Comb. nov.**)

Plate 5, figs. 1–12

Chlamydezza favus lemchei Powell, 1958: 70–71, pl. 9 figs. 7–8.

Type data: Holotype (lv) ZMUC BIV-39; paratype (R.V.) ZMUC BIV-40, "Galathea" stn 674, 29°15'S, 177°5'W, off Raoul Island, Kermadec Islands, 75–85 m.

Other material examined: KERMADEC ISLANDS: AUZ113, off Curtis I., 302 m, R.N.Z.F.A. "Tui" (NMNZ M.224641, 2 v); BS296, off Hutchison Bluff, Raoul I., 84–113 m, R.V. "Acheron" (NMNZ M.222020, 25 v); BS434, 29°12.7'S, 177°56.1'W, NW of Fleetwood Bluff, Raoul I., 135 m, R.V. "Acheron" (NMNZ M.225444, many v); BS438, 29°14.7'S, 177°49.4'W, SE of Nugent I., Raoul I., alive, 146–165 m, R.V. "Acheron" (NMNZ M.225672, many pr); BS439, 29°15.3'S, 177°49.3'W, E of Chanter Is., Raoul I., 256–348 m, R.V. "Acheron" (NMNZ M.225399, 1 v); BS570, 29°14.73'S, 177°50.34'W, E of Dayrell I., Herald Is., alive, 135–146 m, R.V. "Acheron" (NMNZ M.226637, 38 pr); BS571, 29°18.8'S, 177°54.2'W, SE of D'Arcy Point, Raoul I., 219–274 m, R.V. "Acheron" (NMNZ M.226789, 12 v); BS572, 29°18.9'S, 177°56.4'W, SE of Smith Bluff, Raoul I., alive, 82–100 m, R.V. "Acheron" (NMNZ M.227157, many pr); BS573, 29°15'S, 177°50.9'W, Herald Is., between Dayrell and Chanter Is., 31–45 m, R.V. "Acheron" (NMNZ M.226973, 28 v); BS577, 29°17.2'S, 177°57.2'W, E end of Denham Bay, Raoul I., 27–29 m, R.V. "Acheron" (NMNZ M.226950, 1 v); BS579, 29°14'S, 177°59.28'W, NW of Hutchison Bluff, Raoul I., 38 m, R.V. "Acheron" (NMNZ M.226729, 16 v); 29°15'S, 177°52'E, Raoul I. (AMS C.300120, 4 v).

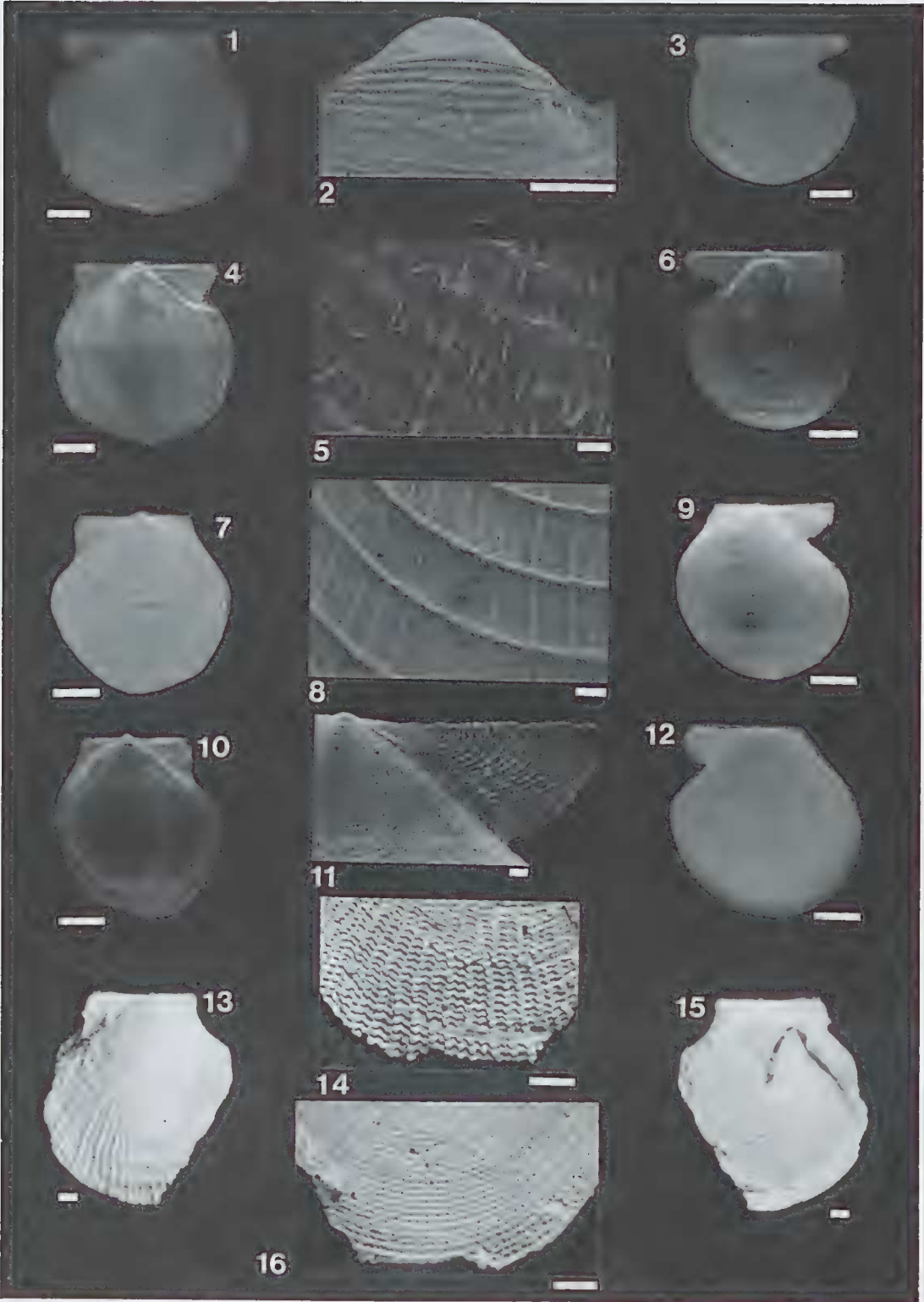
Distribution: Kermadec Islands, 27–348 m, living at 82–165 m.

Remarks: The present specimens are indistinguishable from the type material. Powell (1958: 71) compared *C. lemchei* with the southern Australian species *Cycloclamys favus* (Hedley, 1902), and observed some differences: "the rapid obsolescence of the concentric lamellae in the left valve, with a compensating stronger development of the radial sculpture". *C. lemchei* differs, however, in attaining up to about 6 mm in length instead of about 3 mm, and is more orbicular in shape. Moreover, *C. lemchei* has a well developed colour pattern, while *C. favus* is colourless. The sculpture of the left valve of *C. favus* is highly variable, ranging from almost smooth to concentrically lamellate, radially lirate or reticulate. *C. lemchei* is constantly ornamented with diverging lirae. The hexagonal microsculpture of the right valve of *C. lemchei* is finer than in *C. favus*. Another closely allied species is *Cycloclamys mestayerae* (Dell, 1956) from off northern New Zealand, which, however, lacks the sculpture on the left valve and is colourless.

Genus *Cyclopecten* Verrill, 1897

Cyclopecten Verrill, 1897: 70. Type species (by subsequent designation of Sykes, Smith & Crick, 1898): *Pecten pustulosus* Verrill, 1873; Recent, off Newfoundland, Canada.

Plate 5. Figures 1–12. *Cycloclamys lemchei* (Powell, 1958), Kermadec Islands, 135–146, NMNZ M.226637. Figs. 1–3, 8, 10 (scale = 1 mm), figs. 4–7, 9 (scale = 100 µm), figs. 11–12 (scale = 10 µm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, exterior, dorsal area. Fig. 3. Left valve, interior. Fig. 4. Left valve, exterior, preradial stage. Fig. 5. Left valve, prodissoconch. Fig. 6. Left valve, exterior, antimarginal microsculpture, postero-ventral area. Fig. 7. Left valve, exterior, commarginal microsculpture, postero-ventral area. Fig. 8. Right valve, exterior. Fig. 9. Right valve, exterior, anterior auricle. Fig. 10. Right valve, interior. Fig. 11. Right valve, exterior, hexagonal microsculpture, antero-ventral area. Fig. 12. idem.



Xenamussium Oyama, 1944: 244. Type species (by original designation): *Pecten hoskynsi* Forbes, 1844; Recent, off Turkey, Mediterranean Sea.

Cyclopecten horridus Dijkstra, 1995

Plate 6, figs. 1–6

Cyclopecten horridus Dijkstra, 1995: 33, figs. 63–64, 98.

Type data: Holotype MNHN, MUSORSTOM 6 stn DW420, 20°29'S, 166°43'E, Loyalty Islands, alive, 600 m.

Other material examined: KERMADEC ISLANDS: K795, 33°02.6'S, 179°34.6'W, alive, 350 m (NZOI, 1 pr).

Distribution: Eastern New Caledonia, Loyalty Islands, and Kermadec Islands; 350–735 m, alive at 350–600 m.

Remarks: The present specimen is similar to the type material of *C. horridus*. Dijkstra (1995) compared two allied propeamussiids (*Parvamussium araneum* Dijkstra, 1991 from the Indonesian Archipelago, and *Parvamussium vidalense* (Barnard, 1964) from off South Africa) with the present one, both of which differ by having a few rudimentary internal costae.

Cyclopecten kapalae Dijkstra, 1990

Plate 6, figs. 7–12

Cyclopecten kapalae Dijkstra, 1990b: 29–32, figs. 1–5.

Type data: Holotype, AMS C.155831.1, 33°31'–33'S, 152°08'–07'E, off Sydney, New South Wales, 907–914 m, F.R.V. "Kapala" stn K80–20–08.

Other material examined: KERMADEC ISLANDS: BS442, 29°16.5'S, 177°49.5'W, SE of Chanter Is., Raoul I., alive, 512–549 m, R.V. "Acheron" (NMNZ M.225614, many pr).

Distribution: New South Wales and the Kermadec Islands; 512–914 m, alive at 512–549 m.

Remarks: The present specimens are similar to the type material, although the concentric lamellae on the left valve are slightly stronger and more widely spaced. Japanese specimens of the superficially similar species *C. bistriatus* (Dall, 1916) have finer reticulate sculpture on the left valve (Dijkstra, 1990b).

Plate 6. Figures 1–6. *Cyclopecten horridus* Dijkstra, 1995, Kermadec Islands, 600 m, NZOI. Figs. 1, 3, 4, 6 (scale = 1 mm), figs. 2, 5 (scale = 100 µm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, prodissoconch. Fig. 3. Right valve, exterior. Fig. 4. Left valve, interior. Fig. 5. Left valve, exterior, commarginal sculpture and lamellae, antero-ventral area. Fig. 6. Right valve, interior. Figures 7–12. *Cyclopecten kapalae* Dijkstra, 1990, Kermadec Islands, 512–549 m, NMNZ M.225614. Figs. 7, 9, 10, 12 (scale = 1 mm), figs. 8, 11 (scale = 100 µm). Fig. 7. Left valve, exterior. Fig. 8. Left valve, exterior, com- and antimarginal microsculpture, antero-ventral area. Fig. 9. Right valve, exterior. Fig. 10. Left valve, interior. Fig. 11. Right valve, exterior, anterior auricle. Fig. 12. Right valve, interior. Figures 13–16. *Cyclopecten kermadecensis* (E.A. Smith, 1885), Kermadec Islands, 1189–1225 m, NMNZ M.222131. Figs. 13–16 (scale = 1 mm). Fig. 13. Left valve, exterior. Fig. 14. Left valve, exterior, microsculpture, ventral area. Fig. 15. Right valve, exterior. Fig. 16. Right valve, exterior, commarginal microsculpture, postero-ventral area.

Cyclopecten kermadecensis (E. A. Smith, 1885)

Plate 6, figs. 13–16

Pecten kermadecensis E. A. Smith, 1885: 302, pl. 21, figs. 7–7a.

Cyclopecten kermadecensis (E. A. Smith). Oliver, 1915: 553; Rombouts, 1991: 73.

Type data: Holotype BMNH 87.2.9.3279, "Challenger" stn 171, 28°33'S, 177°50'W, N of Kermadec Islands, 1097 m.

Other material examined: KERMADEC ISLANDS: BS312, 4 miles NNE of Herald Is., Raoul I., alive, 1189–1225 m, R.V. "Acheron" (NMNZ M.222131, 1 pr).

Distribution: Kermadec Islands, 1097–1225 m, living at 1189–1225 m.

Remarks: Smith (1885) stated that "Only two valves ... were obtained, and it is even possible that they do not both belong to one and the same species..." From examination of the two valves it is plausible that they represent a single individual, as the length of the hinge line of both valves (4.5 mm) is the same, and both valves fit together well. The fragile marginal apron of the right valve is broken off.

The present specimen is similar to the type valves.

Family Pectinidae Wilkes, 1810

[emend., Waller, 1978]

Subfamily Camptonectinae Habe, 1977

Genus *Delectopecten* Stewart, 1930

Delectopecten Stewart, 1930: 118. Type species (by original designation): *Pecten* (*Pseudamusium* [sic]) *vancouverensis* Whiteaves, 1893; Recent, Vancouver Island, British Columbia, Canada.

Remarks: Grau (1959: 38) and Beu (1970: 117) synonymised *Catillopecten* Iredale, 1939 with *Delectopecten*. Waller (1984: 214), however, treated *Catillopecten* as a distinct genus of Propeamussiidae. Schein (1989: 81) placed *Catillopecten* in Propeamussiinae Abbott, 1954 of Pectinidae and mentioned that *Bathypecten* Schein-Fatton, 1985 is closely related to *Catillopecten*. Recently Waller & Marincovich (1992: 219) placed *Delectopecten* in Camptonectinae Habe, 1977.

Delectopecten musorstomi Poutiers, 1981

Plate 8, figs. 1–6

Delectopecten musorstomi Poutiers, 1981: 331–332, pl. 1, figs. 2–3; Dijkstra, 1991: 26–27; 1995: 45, figs. 69–70.

Type data: Holotype MNHN, MUSORSTOM I stn 18, 13°57'N, 120°16.5'E, N of Lubang, Philippines, alive, 150–159 m.

Other material examined: NORFOLK ISLAND: AUZ037, 20°20'S, 168°09'E, off Norfolk I., 201 m, R.N.Z.F.A. "Tui" (NMNZ M.224686, 3 v).

Distribution: Philippines, Indonesian Archipelago, New Caledonia, and Norfolk Island; 130–495 m, living at 150–250 m.

Remarks: The present specimens are very similar to the holotype. There are fewer radial costae on the left valve than on the holotype (c. 12 instead of c. 20), but the number of costae is variable in material from Indonesia (12–18) (NNM). Moreover, the radial costae on the right valve are weaker

than in material from elsewhere. A closely allied species is *Delectopecten alcocki* (E. A. Smith, 1904), which attains much larger size (to c. 15 mm) and is ornamented with irregular scratches and (usually) delicate concentric lamellae. The radial costae are not squamous as in *D. musorstomi*. Another allied species is *Delectopecten fosterianus* (Powell, 1933) from New Zealand, which is also larger (to c. 20 mm), transparent, nearly smooth and lacks the characteristic diverging scratches.

Subfamily Hemiptectinae Habe, 1977

Genus *Hemiptecten* A. Adams & Reeve, 1849

Hemiptecten A. Adams & Reeve, 1849: 133. Type species (by monotypy): *Hemiptecten forbesianus* A. Adams & Reeve, 1849; Recent, Sulu Archipelago, Philippines.

Hemiptecten forbesianus A. Adams & Reeve, 1849

Plate 7, figs. 1–6

Hemiptecten forbesianus A. Adams & Reeve, 1849: 133, pl. 1, fig. 2; 1850: 72, pl. 20, figs. 1a–c, 2a–d; Waller, 1972: 256; Yonge, 1981: 23, 5 figs.; Dijkstra, 1990a: 5, pl. 2, figs. 11–12; Dijkstra et al., 1990: 3, fig.; Dijkstra, 1991: 24, fig.; Bernard, Cai & Morton, 1993: 51.

Pecten difformis Odhner, 1917: 15, pl. 1, figs. 4–5.

Cyclopecten (Hemiptecten) forbesianus (A. Adams & Reeve). Rombouts, 1991: 79.

Type data: *Hemiptecten forbesianus*: Lectotype (here designated) BMNH 1874.12.11.376, figured in Adams & Reeve (1849: pl. 1 fig. 2; 1850: pl. 20 figs 2a–d); paralectotype (Adams & Reeve, 1850: pl. 20 figs. 1a–c) not in type lot and not yet traced, Sulu Archipelago, c. 26 m. *Pecten difformis*: 6 Syntypes SMNH 1555, Pearl Bank, off Cape Jaubert, Western Australia.

Other material examined: NORFOLK ISLAND: I78, 29°06.8'S, 167°56.3'E, 6–28 m (NZOI, 1 pr).

Distribution: Southern Japan, Philippines, South China Sea, Indonesia, Western, northern and eastern Australia, Coral Sea, New Caledonia; 0–84m, living at 10–67 m.

Remarks: The present specimen is similar to the type material. Australian specimens (AMS, WAM) are very variable in shape (circular to elongate and oblique) probably caused by a constricted living position on the scleractinian coral *Turbinaria* (Yonge, 1981: 29). The shell characters of the immature type specimens of *P. difformis* from Western Australia are identical to that of *H. forbesianus*. The present specimen from Norfolk is exceptionally large (height 39.5 mm).

Subfamily Pectininae Wilkes, 1810

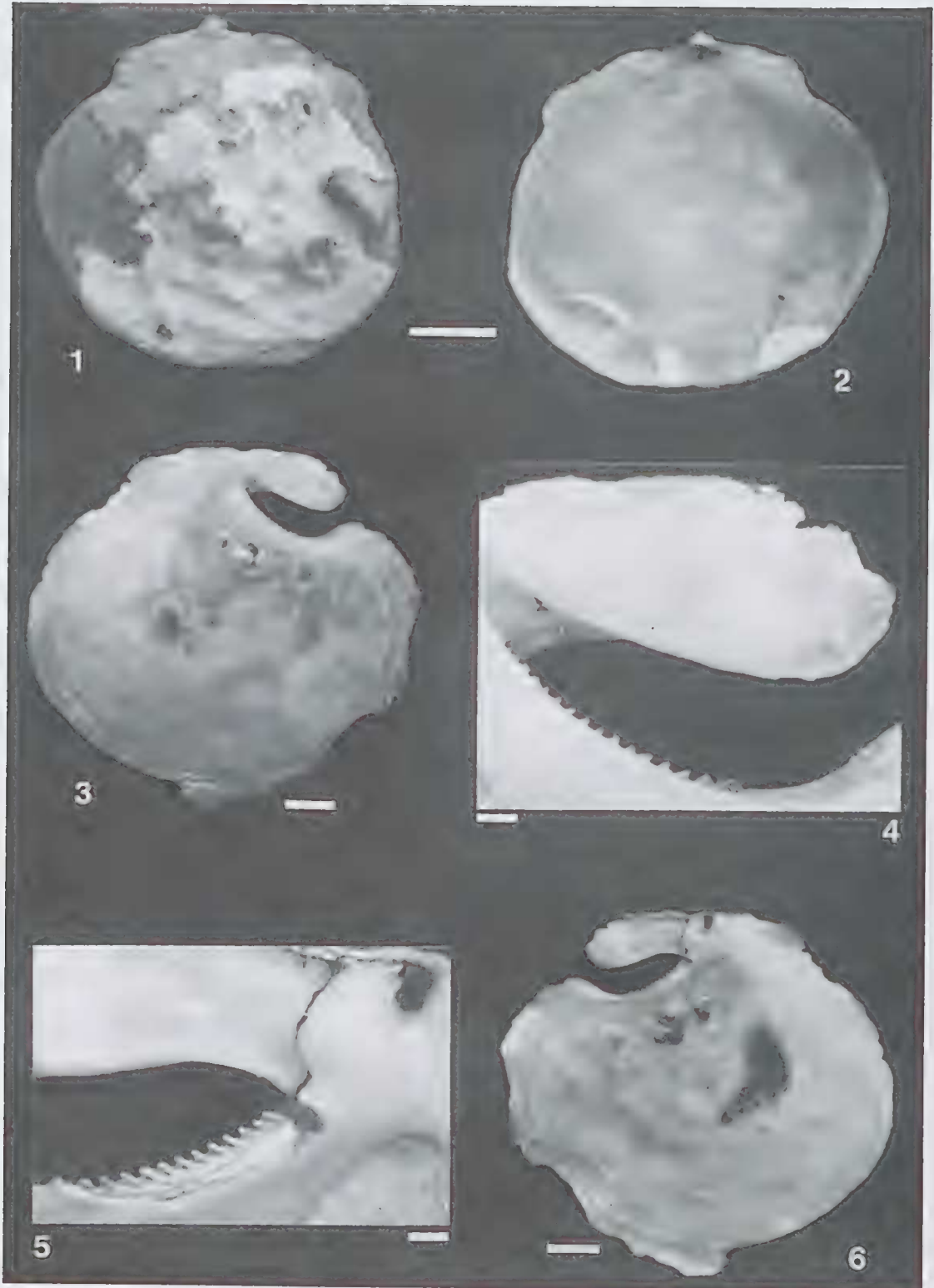
Tribe Pectinini Wilkes, 1810

Genus *Pecten* Müller, 1776

Pecten Müller, 1776: 248. Type species (by subsequent designation of Schmidt, 1818): *Ostrea maxima* Linnaeus, 1758; Recent, E Atlantic.

Deperetia von Teppner, 1922: 87, 259. Type species (by original designation): *Pecten cristatocostatus* Sacco, 1897; Miocene, Turin, Italy.

Heritschia von Teppner, 1922: 87, 264. Type species (by original designation): *Pecten aduncus* von Eichwald, 1830; Miocene, NW Ukraine.



Jaworskia von Teppner, 1922: 87, 266. Type species (by original designation): *Pecten grandis* J. de C. Sowerby, 1828; Pliocene, Suffolk Crag, Great Britain.

Notovola Finlay, 1926: 451. Type species (by original designation): *Pecten novaezelandiae* Reeve, 1852; Recent, New Zealand.

Pecten fumatus Reeve, 1852

Plate 13, figs. 1–2

Pecten medius Lamarck, 1819: 163; Hedley, 1902: 303; Pritchard & Gatliff, 1904: 261; Suter, 1913: 874 (partly); Iredale, 1924: 193; Finlay, 1926: 451; Cox, 1929: 203; Dijkstra, 1995 (not Bosc, 1802).

Pecten ziczac var. b Lamarck, 1819: 164; Deshayes in Lamarck, 1836: 131.

Pecten fuscus Sowerby II, 1842: 47, pl. 16, figs. 118–119 (not Bosc, 1802).

Pecten bifidus Menke, 1843: 35 (not Münster in Goldfuss, 1836); Philippi, 1845: 202, pl. 2, fig. 6.

Pecten lamarckii Chenu, 1843: 2, pl. 9, fig. 1 (not DeFrance, 1825).

Pecten fumatus Reeve, 1852: spec. 32, pl. 7, fig. 32; Tate, 1887: 108; Fleming, 1951: 132; Rombouts, 1991: 50, pl. 18, fig. 8; Lamprell & Whitehead, 1992: no. 83, pl. 14, fig. 83.

Pecten modestus Reeve, 1852: spec. 41, pl. 11, fig. 41 (not Bosc, 1802).

Vola laicostata Angas, 1865: 656 (not Gray in Yate, 1835).

Vola fumata (Reeve). Angas, 1867: 933.

Pecten (*Janira*) *fumatus* Reeve. E. A. Smith, 1885: 307.

Pecten fumatus var. *albus* Tate, 1887: 113.

Pecten meridionalis Tate, 1887: 115 (not von Eichwald, 1865).

Notovola fumata (Reeve). Iredale, 1939: 365.

Notovola preissiana Iredale, 1949: 19.

Notovola meridionalis (Tate). Allan, 1950: 279, pl. 39, fig. 1.

Pecten jacobaeus byronensis Fleming, 1955: 108, fig. 1; 1957: 10, 16, 19, 25, 40, pl. 7, fig. 3 (holotype).

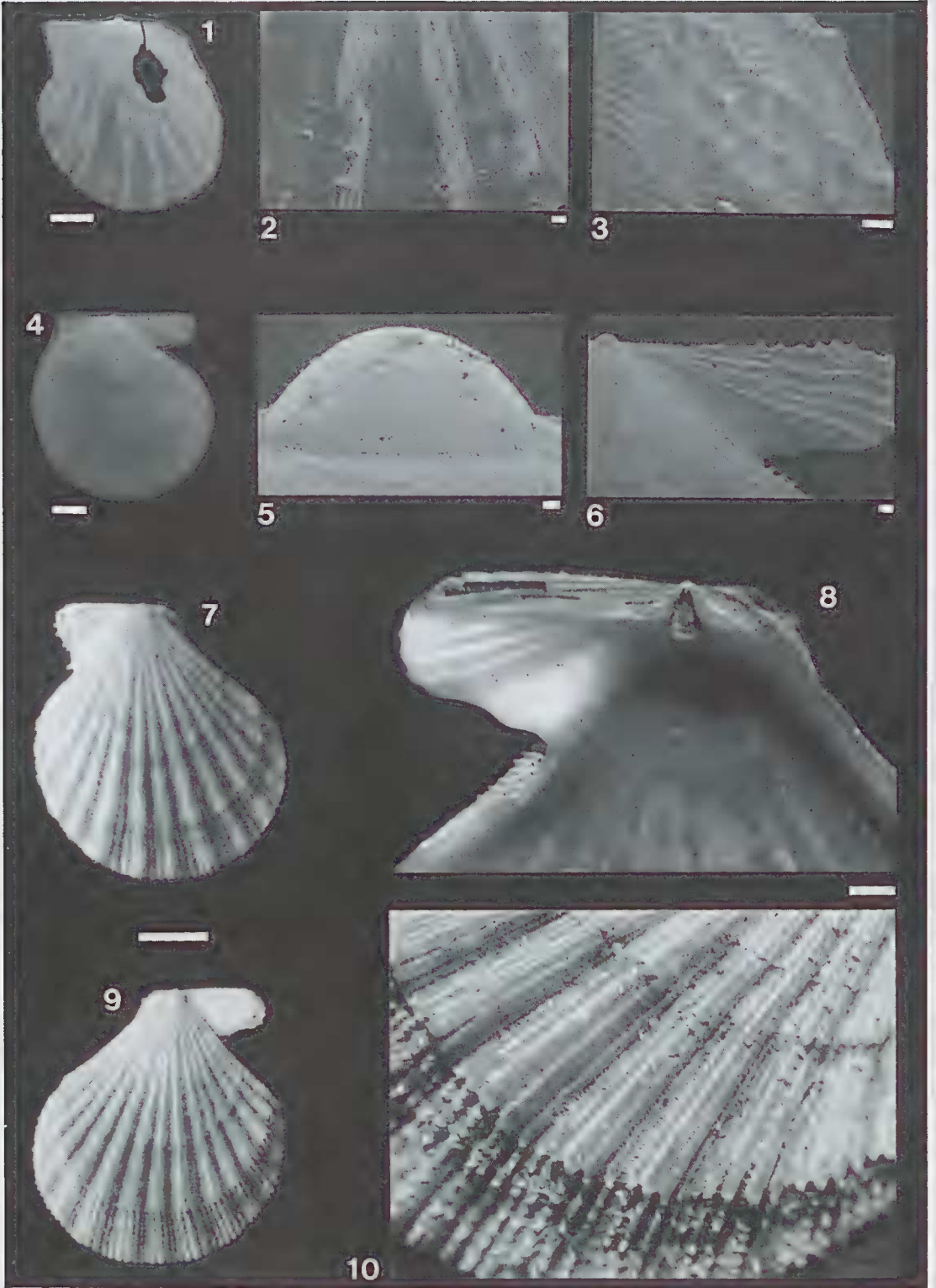
Pecten benedictus albus Tate. Fleming, 1957: 9, 16, 17, 19, 22, 33, pl. 2, fig. 1.

Pecten benedictus fumatus Reeve. Fleming, 1957: 9, 13, 16, 17, 19, 22, 28, 32, 33, 34, pl. 1, fig. 5 (lectotype).

Pecten jacobaeus meridionalis Tate. Fleming, 1957: 10, 12, 15, 16, 20, 22, 25, 32, 39, 40, pl. 7, fig. 4.

Pecten modestus Reeve. Fleming, 1957: 10, 16, 19, 36, 37, 38, pl. 7, figs. 5 (lectotype), 6 (paralectotype).

Plate 7. Figures 1–6. *Hemipecten forbesianus* Adams & Reeve, 1849, Norfolk Island, 6–28 m, NZOI. Figs. 1–2 (scale = 10 mm), figs. 3, 6 (scale = 5 mm), figs. 4–5 (scale = 1 mm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, interior. Fig. 3. Right valve, exterior. Fig. 4. Right valve, exterior, anterior auricle. Fig. 5. Right valve, interior, tenorium. Fig. 6. Right valve, interior.



Notovola alba (Tate). Cotton, 1961: 96, fig. 81.

Pecten alba [sic] Tate. Macpherson & Gabriel, 1962: 300, fig. 341.

Notovola byronensis (Iredale). Garrard, 1969: 5.

Type data: *Pecten medius*: Lectotype (Dijkstra, 1995) and 3 paralectotypes MNHN, Australia (designated by Dijkstra, 1995). *Pecten fuscus*: 3 syntypes BMNH 1994.164, Moreton Bay, Queensland (Reeve, 1852). *Pecten fumatus*: 3 syntypes BMNH 1950.11.14.32–34, Sydney, New South Wales. *Pecten modestus*: Holotype UMZC 1382, Moreton Bay, Australia [sic] (= Swan River, Western Australia). *Pecten fumatus* var. *alba* [sic]: Holotype SAM D.8920, Port Lincoln, South Australia. *Notovola preissiana*: 5 syntypes AMS C.90371, Shark Bay, Western Australia. *Pecten jacobaeus byronensis*: Holotype AMS C.5243 and 2 paratypes (AMS C.170831), Byron Bay, New South Wales.

Other material examined: LORD HOWE ISLAND: NZOI stn P106, 31°27.7'S, 159°02.6'E, alive, 53 m (NZOI, 1 pr).

Distribution: Southern Queensland, New South Wales, Lord Howe I., Victoria, Tasmania, South Australia, and Western Australia as far north as Shark Bay; 0–80 m, living at 10–73 m.

Remarks: The present specimen is similar to the Queensland form of *P. fumatus*, although the radial costae of the left valve are somewhat more angular.

In a recent analysis of genetic variation in Australasian *Pecten*, Woodburn (1989) concluded that *P. meridionalis* Tate, 1887 (Tasmania) and *P. albus* Tate, 1887 (Victoria and South Australia) are synonyms of *P. fumatus* (Queensland and New South Wales), and that *P. novaezelandiae* and the Western Australian form (*N. preissiana* Iredale, 1949) are specifically distinct. The taxonomic status of *P. raoulensis* has yet to be determined.

A discussion of the Australian species of *Pecten* will be given elsewhere.

Pecten raoulensis Powell, 1958

Plate 13, figs. 3–4

Pecten medius Lamarck. Oliver, 1915: 553 (not Lamarck, 1819).

Pecten raoulensis Powell, 1958: 67, pl. 10, figs. 1–2.

Pecten novaezelandiae raoulensis Powell. Fleming, 1962: 184.

Type data: Holotype ZMUC, "Galathea" stn 674, 29°15'S, 177°57'W, off Raoul I., Kermadec Is., 75–85 m.

Other material examined: KERMADEC ISLANDS: Raoul I., dredged, R.S. Bell, 1913 (NMNZ, 1 pr, 1 v); BS 307, off and between Bell's Flat and Hutchison Bluff, Raoul I., alive, 110–146 m, R.V. "Acheron" (NMNZ, 1 pr); BS 308, between Bell's Flat and Hutchison Bluff, Raoul I., alive, 110–121

Plate 8. Figures 1–6. *Delectopecten musorstomi* Poutiers, 1981, Norfolk Island, 201 m, NMNZ M.224686. Figs. 1, 4 (scale = 1 mm), figs. 2, 3, 6 (scale = 100 µm), fig. 5 (10 µm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, exterior, microsculpture, ventral area. Fig. 3. Left valve, exterior, antimarginal microsculpture, postero-ventral area. Fig. 4. Right valve, exterior. Fig. 5. Right valve, prodissoconch. Fig. 6. Right valve, exterior, anterior auricle. Figures 7–10. *Chlamys coruscans coruscans* (Hinds, 1845), Kermadec Islands, NMNZ M.202881. Figs. 7–9 (scale = 5 mm), figs. 8, 10 (scale = 1 mm). Fig. 7. Left valve, exterior. Fig. 8. Right valve, interior, dorsal area. Fig. 9. Right valve, exterior. Fig. 10. Right valve, exterior, costae with intermediate shagreen (reticulated) microsculpture, postero-ventral area.

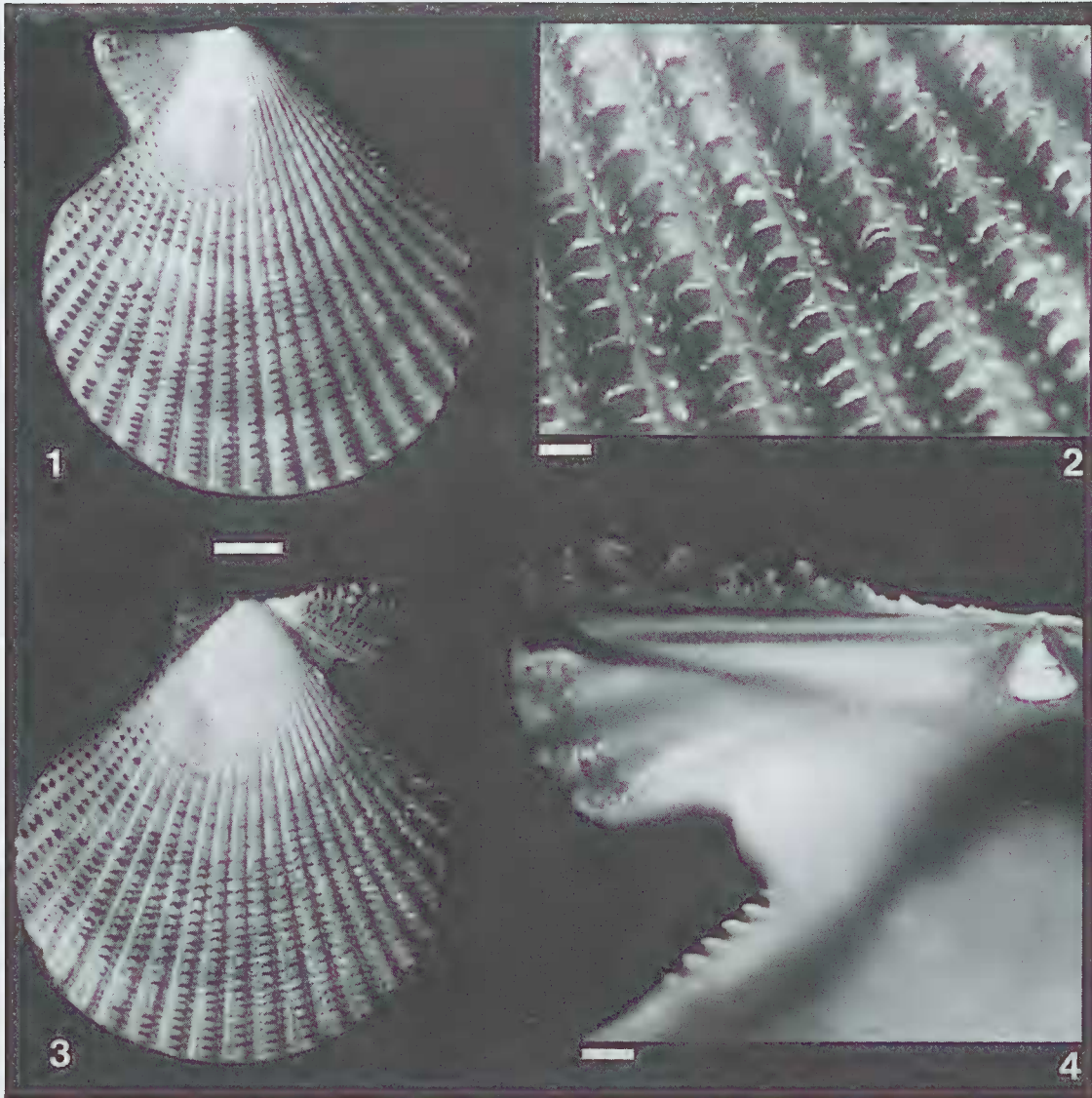


Plate 9. Figures 1–4. *Mimachlamys senatoria* (Gmelin, 1791), Norfolk Island, 65 m, NZOI. Figs. 1, 3 (scale = 5 mm), figs. 2, 4 (scale = 1 mm). Fig. 1. Left valve, exterior. Fig. 2. Left valve, exterior, costae with lamellae, postero-ventral area. Fig. 3. Right valve, exterior. Fig. 4. Right valve, interior, anterior auricle, ctenolium.

m, R.V. "Acheron" (NMNZ, 1 pr); BS 296, off Hutchison Bluff, Raoul I., 84–113 m, R.V. "Acheron" (NMNZ, 6 v); K818, 29°13.31'S, 177°56.36'W, 95 m (NZOI, 1 v); K819, 29°13.24'S, 177°56.30'W, 100 m (NZOI, several v); K820, 29°13.30'S, 177°59.80'W, 95 m (NZOI, several v); 29°14.6'S, 177°52.6'W, off westside of Meyer I., 30 m (AIM AK.78573, 2 v); BS 567, 29°16'S, 177°52'W, East Anchorage, Raoul I., 42–47 m, R.V. "Acheron" (NMNZ, 2 v); BS 436, 29°18.5'S, 177°54.5'W, SE of D'Arcy Point, Raoul I., 44 m, R.V. "Acheron" (NMNZ, 1 v); K856, 30°33.5'S, 178°31.1'W, 125–130 m (NZOI, 1 v).

Distribution: Off Raoul Island, Kermadec Islands, 75–130 m, living at 110–146 m.

Remarks: *Pecten raoulensis* is similar to the New Zealand species *P. novaezelandiae* Reeve, 1852, and the Australian species *P. fumatus* Reeve, 1852, both of which are variable in sculpture, auricle size, valve convexity, colour and colour pattern. Specimens from depths greater than 50 m, including the holotype, have sculpture that falls within the range exhibited by both Recent *P. novaezelandiae* and *P. fumatus*. Specimens from shallower depths differ from Recent *P. novaezelandiae* in the greater strength and earlier appearance of the concentric lamellae, and in the greater strength of the radial sculpture in shells less than 20 mm in length. The latter specimens thus more closely resemble *P. fumatus* than *P. novaezelandiae*, especially specimens from Queensland. Both Kermadec forms, which are evidently conspecific, differ further from *P. novaezelandiae* in that the left valve extends further beyond the right valve and more strongly overhangs it, as in many specimens of *P. fumatus*. We conclude, therefore, that *P. raoulensis* is more closely related to *P. fumatus* than to *P. novaezelandiae*, which is contrary to the opinion of Fleming (1962), who considered it a geographic subspecies of *P. novaezelandiae*.

Genus *Amusium* Röding, 1798

Amusium Röding, 1798: 165. Type species (by subsequent designation of Herrmannsen, 1846): *Ostrea pleuronectes* Linnaeus, 1758; Recent, Indonesia.

Pleuronectia Swainson, 1840: 388. Type species (by monotypy): *Pleuronectia laevigata* Swainson, 1840 (= junior synonym of *Ostrea pleuronectes* Linnaeus, 1758); Recent, Indo-West Pacific.

Amusium balloti (Bernardi, 1861)

Pecten balloti Bernardi, 1861: 46–48, pl. 1, fig. 1; Lischke, 1869: 165.

Pecten (Amusium) balloti Bernardi. De Gregorio, 1898: 7–8, pl. 1, figs. 3–4, 7; pl. 4, fig. 4.

Amusium japonicum balloti (Bernardi). Habe, 1964a: 4–5, pl. 1, fig. 5; pl. 2, fig. 6; Abbott & Dance, 1982: 303, fig.; Waller, 1991: 18, 37, pl. 8, figs. 5, 8.

Amusium balloti (Bernardi). Iredale, 1939: 369; Wells & Bryce, 1988: 158, pl. 60, fig. 579; Dijkstra, 1988: 3–4, figs.; 1990a: 3, figs.; 1991: 25–26; Dijkstra et al., 1989: 24; Rombouts, 1991: 3–4, pl. 2, figs. 5–5a; Lamprell & Whitehead, 1992: text unpag., pl. 7, fig. 38.

Type data: 3 Syntypes MNHN, "Nova-Caledonia" (New Caledonia).

Other material examined: NORFOLK ISLAND: P18, 29°34.60'S, 168°03.00'E, 90 m (NZOI, 1 v); P38, 29°10.40'S, 167°55.80'E, 64 m (NZOI, 2 v).

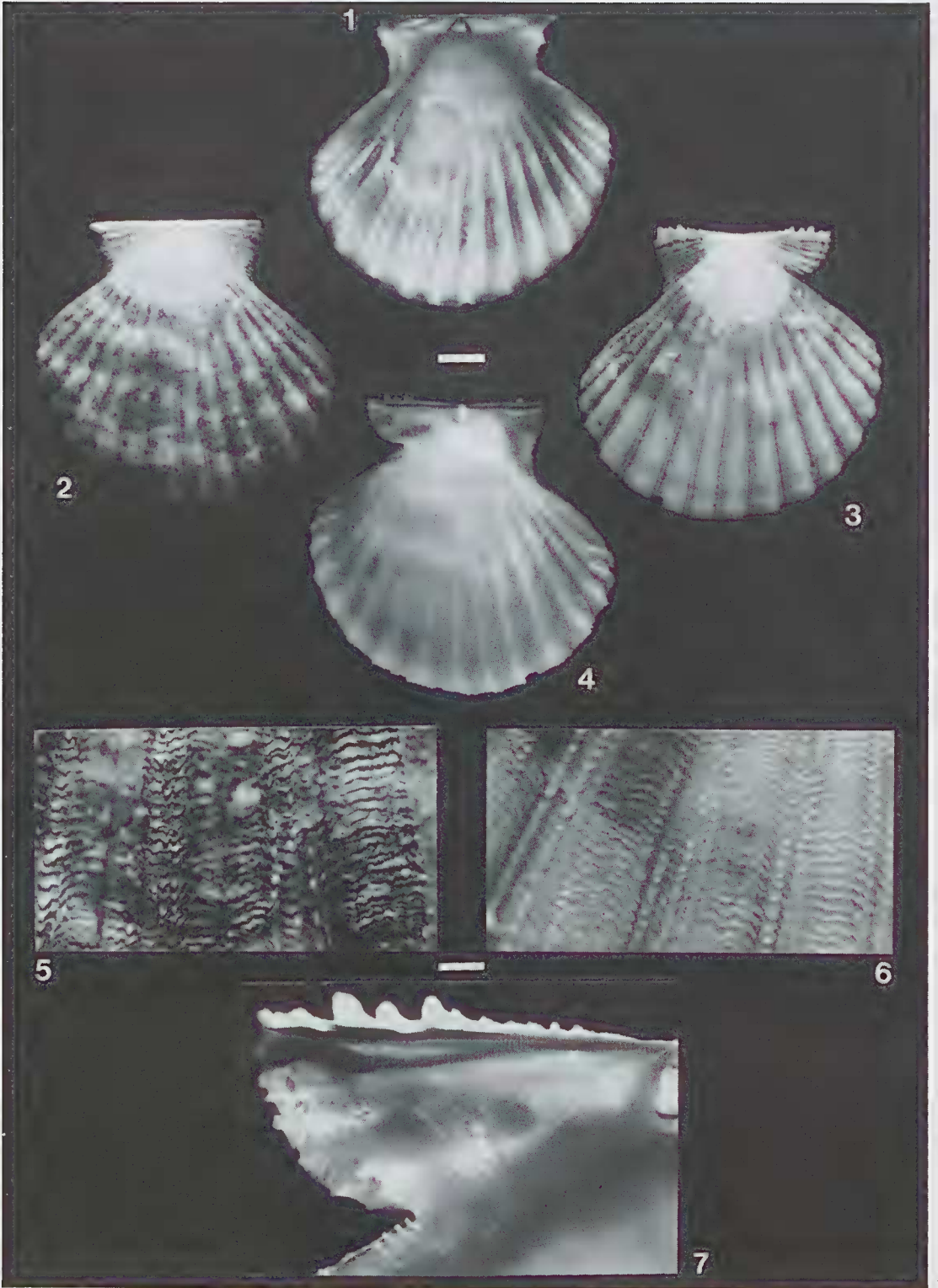
Distribution: Southwestern, southeastern and eastern Australia, Coral Sea, New Caledonia and Norfolk Island; 0–84 m, living at 18–60 m.

Remarks: Habe (1964a) treated *Amusium balloti* as a subspecies of *A. japonicum*, noting that while both are very similar in shape, *A. balloti* has fewer internal costae and is reddish brown instead of deep red. *A. japonicum* has not been recorded from the Philippines or the Indonesian Archipelago and despite their similarity, there seems to be no sufficient reason to treat *A. balloti* as a geographic subspecies. Forms with intermediate characters are unknown. Wang's (1984) record of *A. balloti* from China could represent a local population of *A. japonicum*, perhaps *A. japonicum taiwanense* Dijkstra, 1988. The present specimens from Norfolk Island are mere fragments.

Tribe Decatopectinini Waller, 1986

Genus *Annachlamys* Iredale, 1939

Annachlamys Iredale, 1939: 358. Type species (by original designation): *Pecten leopardus* Reeve, 1853 (= junior synonym of *Pecten flabellatus* Lamarck, 1819); Recent, Australia.



Annachlamys iredalei (Powell, 1958)

Plate 10, figs. 1–7

Aequipecten (Corymbichlamys) iredalei Powell, 1958: 68–69, pl. 11, figs. 1–2, text fig. 2.*Annachlamys iredalei* (Powell). Dijkstra, 1989a: 19–20, figs.; 1990a: 8, 10, figs.; Dijkstra et al., 1989: 24; Lamprell & Whitehead, 1992: text unpag., pl. 11, fig. 64.*Corymbichlamys iredalei* (Powell). Rombouts, 1991: 36, pl. 13, fig. 6.

Type data: Holotype ZMUC BIV–37, “Galathea” stn 675, 29°13.5'S, 177°57'W, off Raoul Island, Kermadec Islands, 58–60 m.

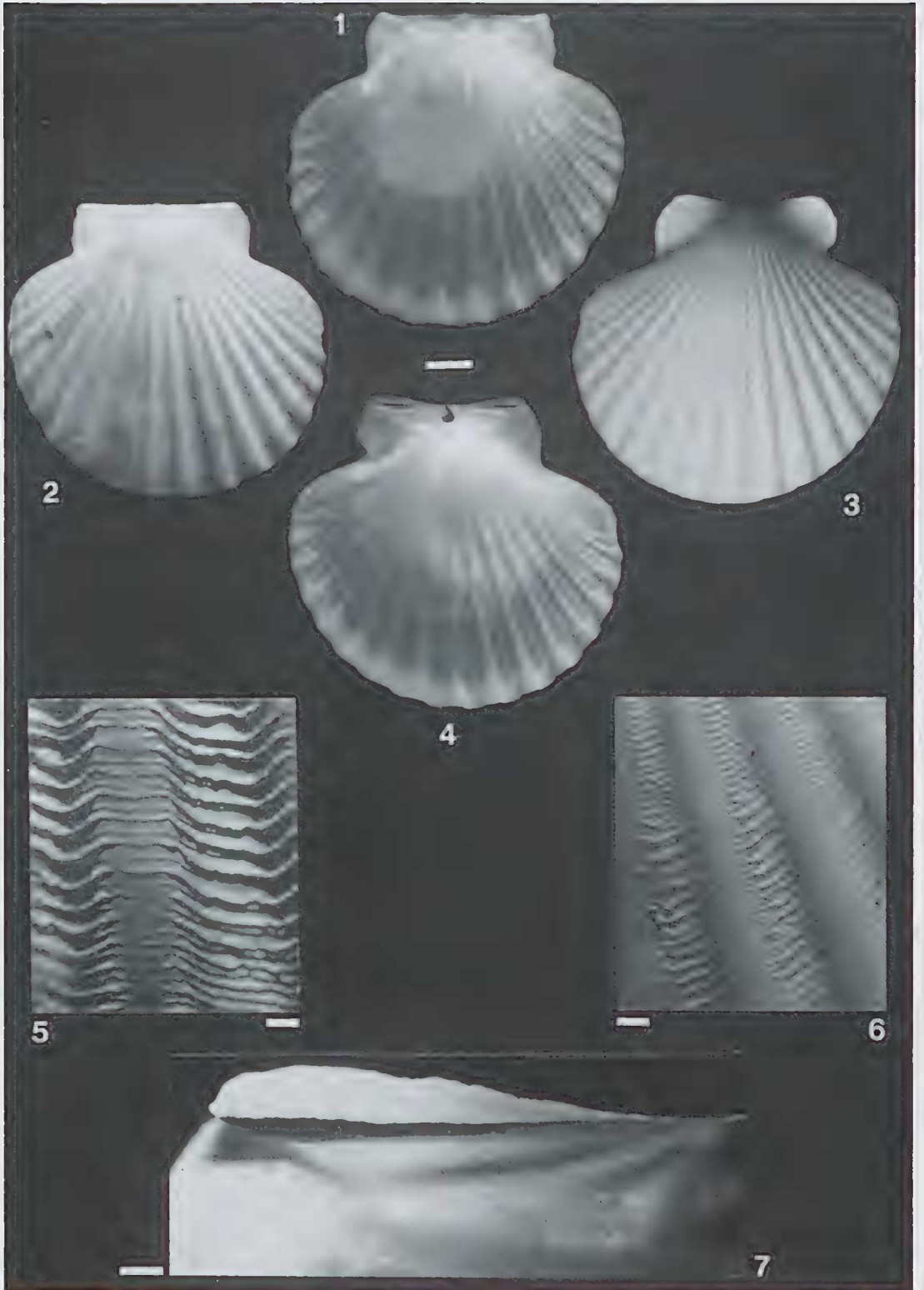
Other material examined: LORD HOWE ISLAND: H.M.A.S. “Kimbla” stn LH 5, 30°25.5'S, 159°5.6'E, 49–51 m (AMS C123839, 10 v); P114, 31°23.9'S, 159°05.4'E, 85–80 m (NZOI, 10 v); P105, 31°26.7'S, 159°07.2'E, 56 m (NZOI, 2 valves); P104, 31°30.0'S, 159°10.0'E, 75–72 m (NZOI, 1 v); P109, 31°30.2'S, 158°57.9'E, 69 m (NZOI, 1 valve); H.M.A.S. “Kimbla” stn LH 1, 31°34.9'S, 159°0.3'E, Lord Howe Rise, 73 m (AMS C123974, 5 v); H.M.A.S. “Kimbla” stn LH 4, 31°37.1'S, 159°13'E, 51–55 m (AMS C123844, many pr); P111, 31°37.6'S, 159°12.4'E, 57 m (NZOI, 2 v); H.M.A.S. “Kimbla” stn LH 2, 31°38.2'S, 159°3.6'E, 44 m (AMS C123718, many pr.); P99, 31°43.2'S, 159°12.4'E, 53–51 m (NZOI, 1 v); 31°45'S, 159°15'E, off Ball's Pyramid, 91–183 m (AMS C300228, 1 v); P82, 31°49.8'S, 159°19.7'E, 78–84 m (NZOI, 3 v). NORFOLK ISLAND: AUZ28, 28°54'S, 167°59'E, N of Norfolk I., 33 m, R.N.Z.F.A. “Tui” (NMNZ M.223562, 1 v); AUZ30, 28°59'S, 167°58'E, N of Norfolk I., 38 m, R.N.Z.F.A. “Tui” (NMNZ M.223567, 1 valve); I84, 29°07.8'S, 168°09.9'E, 65 m (NZOI, 3 v); I71, 29°09.8'S, 168°02.1'E, 57 m (NZOI, 3 v); P36, 29°10.20'S, 168°09.50'E, 76 m (NZOI, 1 v); P38, 29°10.40'S, 167°55.80'E, 64 m (NZOI, 1 v); K819, 29°13.24'S, 177°56.30'W, 100 m (NZOI, 2 v); K820, 29°13.30'S, 177°59.80'W, 95 m (NZOI, 1 fragment); P22, 29°30.90'S, 167°58.80'E, 56 m (NZOI, 1 v); P18, 29°34.60'S, 168°03.00'E, 90 m (NZOI, 4 v). KERMADEC ISLANDS: T233, 29°13.00'S, 178°00.00'W, 100 m (NZOI, 1 v); K820, 29°13.30'S, 177°59.80'W, 95 m (NZOI, 4 v); 29°14.6'S, 177°52.6'W, Meyer I., west-side, 15–30 m (AIM AK.78572, 1 pr); BS573, 29°15'S, 177°50.9'W, between Dayrell and Chanter Is., Herald Is., 31–45 m, R.V. “Acheron” (NMNZ M.227103, 1 juv. pr & 2 v); “Galathea” stn 675, 29°15'S, 177°52'W, off Raoul I., 58–60 m (AMS C81779, 2 v); BS436, 29°18.5'S, 177°54.5'W, SE of D'Arcy Point, Raoul I., 44 m, R.V. “Acheron” (NMNZ M.225783, 3 v); BS572, 29°18.9'S, 177°56.4'W, SE of Smith Bluff, Raoul I., 82–100 m, R.V. “Acheron” (NMNZ M.226585, 4 v); K796, 31°20.8'S, 178°49'W, 70 m, alive (NZOI, 1 pr & 1 v); K797, 31°20.8'S, 178°49.2'W, 55–70 m (NZOI, 6 v).

Distribution: Coral Sea, New Caledonia, Lord Howe Island, Norfolk Island, and Kermadec Islands; 31–183 m, living at 15–55 m.

Remarks: This species is closely similar to *Annachlamys reevei* (Adams in Adams & Reeve, 1850), which ranges from southern Japan to northern Australia, and has recently been found off Somalia (HD colln). Compared with *A. reevei*, *A. iredalei* tends to have more numerous radial ribs (16–18 instead of 16), which are higher and more rounded. Delicate concentric lamellae are developed over the entire shell disc of both species, although they are somewhat interrupted in *A. iredalei*, because of the close-set secondary radial riblets on the costae.

Pecten flabellatus Lamarck, 1819 (northern, western and eastern Australia) differs from *A. iredalei* in having a flatter left valve, slightly larger auricles, less prominent rounded costae, and in lacking secondary radial riblets.

Plate 10. Figures 1–7. *Annachlamys iredalei* (Powell, 1958), Kermadec Islands, 70 m, NZOI. Figs. 1–4 (scale = 5 mm), figs. 5–7 (scale = 1 mm). Fig. 1. Left valve, interior. Fig. 2. Left valve, exterior. Fig. 3. Right valve, exterior. Fig. 4. Right valve, interior. Fig. 5. Left valve, exterior, microsculpture, ventral area. Fig. 6. Right valve, exterior, microsculpture, postero-ventral area. Fig. 7. Right valve, interior, anterior auricle, ctenolium.



Annachlamys kuhnoltzi (Bernardi, 1860)

Plate 11, figs. 1–7

Pecten kuhnoltzi Bernardi, 1860: 378–379, pl. 13, fig. 1.*Annachlamys leopardus rena* Iredale, 1939: 359 (**Syn. nov.**).*Annachlamys kuhnoltzi* (Bernardi). Dijkstra, 1986: 19, 21, figs.*Annachlamys flabellata kuhnoltzi* (Bernardi). Dijkstra et al., 1990: 9, 10, fig.*Annachlamys flabellata* (Lamarck). Lamprell & Whitehead, 1992: pl. 11, fig. 63 (partly not Lamarck, 1819).Type data: *Pecten kuhnoltzi*: Holotype MNHN, New Caledonia. *Annachlamys leopardus rena*: Holotype AMS C.119783, 23°18'S, 151°42'E, North-West Island, Capricorn Group, Queensland.

Other material examined: LORD HOWE ISLAND: P106, 31°27.7'S, 159°02.6'E, alive, 53 m (NZOI, 1 pr); P112, 31°34.6'S, 159°07.9'E, alive, 50 m (NZOI, 2 pr); H.M.A.S. "Kimbla" stn LH 1, 31°34.9'S, 159°1.3'E, 73 m (AMS C.123973, 9 v); H.M.A.S. "Kimbla" stn LH 4, 31°37.1'S, 159°13'E, 51–55 m (AMS C.123846, 6 v).

Distribution: Coral Sea, New Caledonia, eastern Australia and Lord Howe Island; 8–73 m, living at 10–69 m.

Remarks: *Annachlamys leopardus rena* Iredale, 1939, based on material from Queensland, is indistinguishable from the holotype and other New Caledonian specimens of *A. kuhnoltzi*, and we consider them synonyms. Allopatric populations of *A. flabellata* from Australia will be discussed elsewhere. The present material from Lord Howe Island is similar to the type specimen of *P. kuhnoltzi*.

Subfamily Chlamydinae von Teppner, 1822

Tribe Chlamydini von Teppner, 1822

Genus *Chlamys* Röding, 1798*Chlamys* Röding, 1798: 161. Type species (by subsequent designation of Herrmannsen, 1847): *Pecten islandicus* Müller, 1776; Recent, N Atlantic.*Chlamys coruscans coruscans* (Hinds, 1845)

Plate 8, figs. 7–10

Pecten coruscans Hinds, 1845: 61–62, pl. 17, fig. 3; Reeve, 1853: sp. no. 149 (not 143), pl. 33, fig. 149; Küster & Kobelt, 1888: 259, pl. 67, fig. 9.*Pecten cuneolus* Reeve, 1853: sp. no. 131, pl. 29, fig. 131.*Pecten sulphureus* Dunker in Küster & Kobelt, 1888: 276, pl. 72, figs. 5–6 (not Bosc, 1802, not Lamarck, 1819).

Plate 11. Figures 1–7. *Annachlamys kuhnoltzi* (Bernardi, 1860), Lord Howe Island, 53 m, NZOI. Figs. 1–4 (scale = 10 mm), figs. 5–7 (scale = 1 mm). Fig. 1. Left valve, interior. Fig. 2. Left valve, exterior. Fig. 3. Right valve, exterior. Fig. 4. Right valve, interior. Fig. 5. Left valve, exterior, commarginal microsculpture, postero-ventral area. Fig. 6. idem, antero-ventral area. Fig. 7. Right valve, interior, antero-dorsal area.

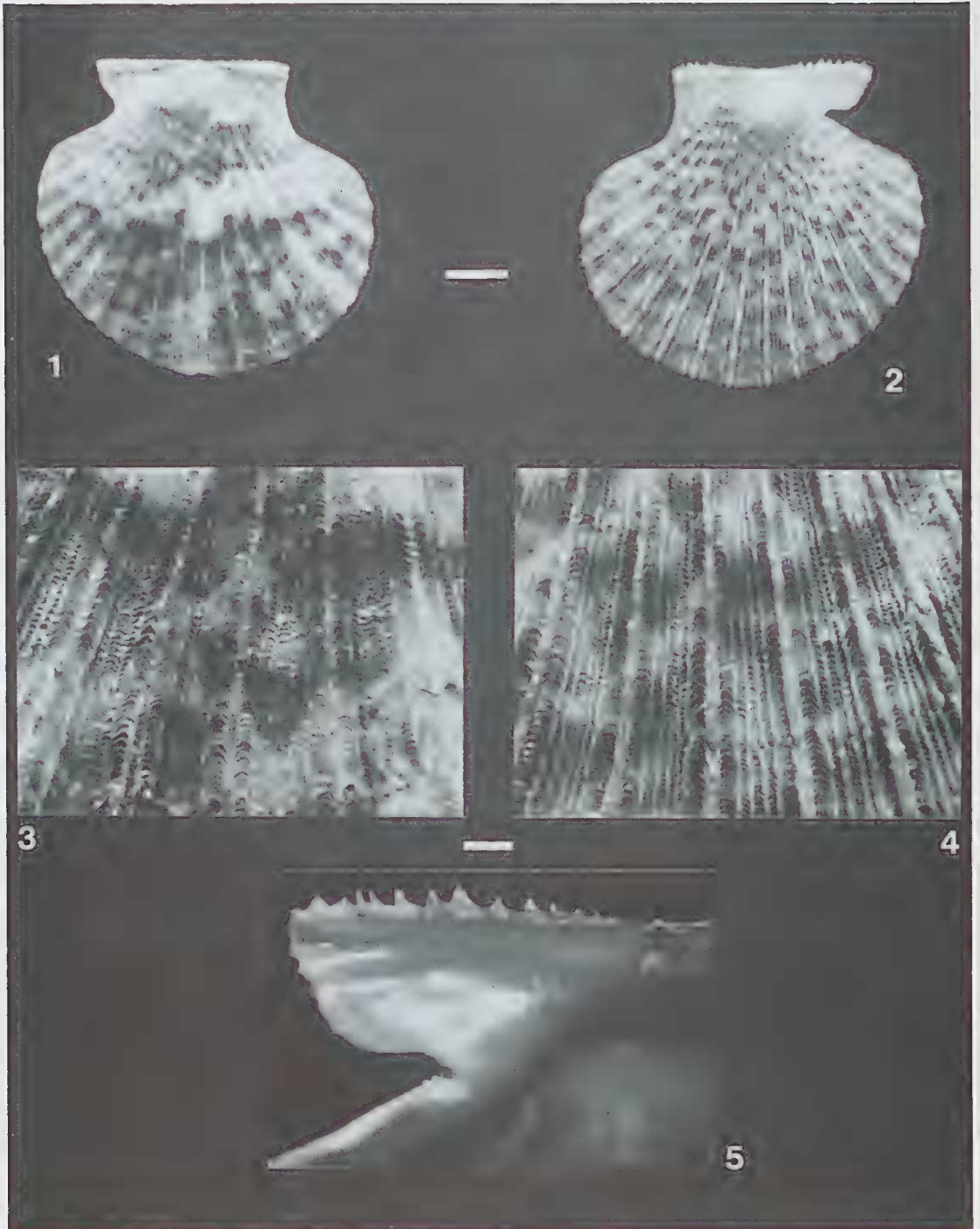


Plate 12. Figures 1-5. *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912), Kermadec Islands, 154 m, NMNZ M.225419. Figs. 1-2 (scale = 5 mm), figs. 3-5 (scale = 1 mm). Fig. 1. Left valve, exterior. Fig. 2. Right valve, exterior. Fig. 3. Left valve, exterior, microsculpture, postero-ventral area. Fig. 4. Right valve, exterior, microsculpture, postero-ventral area. Fig. 5. Right valve, interior, anterior auricle, ctenolium.

Pecten kermadecensis Oliver, 1911: 527 (not E. A. Smith, 1885); 1915: 554.

Chlamys cellularis Oliver, 1915: 554, pl. 12, fig. 46 (**Syn. nov.**).

Pecten eucosmia Turton, 1932: 222, pl. 57, fig. 1549.

Chlamys coruscans (Hinds). Dautzenberg & Bouge, 1933: 426; Waller, 1972: 231–236, pl. 1, figs. 1–19, figs. 2, 12, 14, table 2; Kilburn & Rippey, 1982: 171, pl. 38, fig. 10; Dijkstra, 1984: 9–10, figs.; 1989b: 12, figs.; 1990: 3–5, figs.; Dijkstra et al., 1989: 24; Rombouts, 1991: 10, pl. 23, figs. 7–7b; Lamprell & Whitehead, 1992: text unpag., pl. 8, fig. 47.

Chlamys schmeltzi (Dunker). Kira, 1962: 137, pl. 49, fig. 10.

Bractechlamys schmeltzi (Dunker). Wang, 1983b: 531, 532, 533, 534, figs. 4–7.

Type data: *Pecten coruscans*: Lectotype BMNH 19709 (Waller 1972: 231), Port Anna Maria, Nukuhiva, Marquesas Islands, 13 m. *Pecten cuneolus*: Lectotype BMNH 1969140 (Waller 1972: 231), "Durban, Natal". *Pecten schmeltzii*: 5 ?Syntypes MNHB, "Upola, Samoa and Viti-Inseln". *Pecten sulphureus*: Holotype MNHB, "An den Viti-Inseln". *Pecten eucosmia*: Holotype OUZM Turton No. 1549, Port Alfred, Zululand, South Africa. *Chlamys cellularis*: Holotype (lv) CM M.688, Beach, Sunday [= Raoul] Island, Kermadec Islands.

Other material examined: LORD HOWE ISLAND: Erscott's Hole, 31°33'S, 159°05'E, alive, 3 m (AMS C.157580, 1 pr); Erscott's Hole, 31°33'S, 159°05'E, reef, 8 m (AMS C.300126, 1 v); H.M.A.S. "Kimbla" stn LH 2, 31°38.2'E, 159°3.6'E, 44 m (AMS C.300123, 1 v). NORFOLK ISLAND: AUZ27, 28°53'S, 168°03'E, NE of Norfolk I., 46 m, R.N.Z.F.A. "Tui" (NMNZ M.223538, 1 pr). KERMADEC ISLANDS: Low flat beach, Sunday I. (NMNZ M.214629, 4 v); Raoul I. (NMNZ M.202881, 2 pr); Raoul I. (AMS C.300125, 9 v); Raoul I., north coast (AIM AK.79528, 9 v); 29°14.6'S, 177°52.6'E, west side of Meyer I. (AIM AK.78582, 3 v).

Distribution: Zululand, Natal, Zanzibar, Mauritius, Maldives, Cocos-Keeling Islands, southern Japan, southern China, Philippines, eastern Australia, Mariana Islands, Caroline Islands, Marshall Islands, Gilbert Islands, Fiji Islands, French Polynesia; 0–82 m, living intertidally to 24 m.

Remarks: The type specimen of *C. cellularis* and other specimens from the Kermadec Islands and Norfolk Island are similar in shell morphology to the type specimens of *C. coruscans*. A geographic subspecies, *Chlamys coruscans hawaiiensis* Dall, Bartsch & Rehder, 1938 (Waller, 1972: 232) occurs off Hawaii. A closely allied form is *Chlamys pasca* (Dall, 1908) from Easter Island, which could also represent a local population of *C. coruscans*. Waller (1972: 233) has discussed the ecology of this species.

The fossil species from Dayrell Islet (Pleistocene) recorded by Oliver (1911) as *Pecten kermadecensis* E. A. Smith, 1885 is also *P. c. coruscans* (Oliver, 1915; Marshall, 1981).

Tribe Mimachlamymini Waller, 1993

Genus *Mimachlamys* Iredale, 1929

Mimachlamys Iredale, 1929: 162. Type species (by original designation): *Pecten asperrimus* Lamarck, 1819; Recent, Australia.

Remarks: Waller (1991: 31; 1993: 200) firmly established the differences between *Chlamys* Röding, 1798 and *Mimachlamys* Iredale, 1939, and placed the latter genus in the tribe *Mimachlamymini*.

Mimachlamys senatoria (Gmelin, 1791)

Plate 9, figs. 1–4

Pallium senatoris Chemnitz, 1784: 320, pl. 65, fig. 617 (not binomial).

Pallium porphyreum Chemnitz, 1784: 330, pl. 66, fig. 632 (not binomial).

Ostrea senatoria Gmelin, 1791: 3327 (based on Chemnitz, 1784: 320, pl. 65, fig. 617).

Ostrea porphyrea Gmelin, 1791: 3328 (based on Chemnitz, 1784: 330, pl. 66, fig. 632).

Pecten aurantius Lamarck, 1819: 175.

Pecten florens Lamarck, 1819: 175.

Pecten indicus Deshayes, 1832: 410–411, pl. 3, fig. 5.

Pecten pseudolima Sowerby, 1842: 78, pl. 20, fig. 235; Reeve, 1853: sp. no. 57, pl. 16, figs. 57a–b.

Pecten layardi Reeve, 1853: sp. no. 80, pl. 21, figs. 80a–b.

Pecten fricatus Reeve, 1853: sp. no. 161, pl. 34, fig. 161.

Pecten blandus Reeve, 1853: sp. no. 162, pl. 34, figs. 162a–b.

Pecten raffrayi Jousseaume, 1886: 221–222, fig.

Pecten (Chlamys) senatoria (Gmelin). Dautzenberg & Bavay, 1912: 4–8.

Mimachlamys ellochena Iredale, 1939: 349, pl. 5, fig. 24.

Chlamys (Mimachlamys) asperrimoides Powell, 1958: 70, pl. 11, figs. 3–4, text fig. 3 (**Syn. nov.**).

Chlamys senatoria (Gmelin). Barnard, 1964: 430; Abbott & Dance, 1982: 309, fig.; Dijkstra, 1990a: 9, 11; Dharma, 1992: 84–85, pl. 20, figs. 3–3a; Oliver, 1992: 74, pl. 13, figs. 1a–b.

Mimachlamys senatoria (Gmelin). Dijkstra et al., 1989: 24; Dijkstra, 1990a: 6–8, figs.; 1991: 34–35; Lamprell & Whitehead, 1992: text unpag., pl. 10, fig. 56; Dijkstra, 1993: 12–13, figs. 1–5.

Chlamys (Mimachlamys) senatoria (Gmelin). Rombouts, 1991: 30 (partly), pl. 11, figs. 6–6a.

Mimachlamys asperrimoides (Powell). Lamprell & Whitehead, 1992: text unpag., pl. 10, fig. 57.

Type data: *Ostrea senatoria*: Lectotype (here designated) ZMUC BIV–45, “Oceano indico” (Indian Ocean). An articulated specimen was in the Moltke collection (now ZMUC), and figured in Chemnitz (1874: pl. 65 fig. 617). *Ostrea porphyrea*: Lectotype (lv) (here designated) ZMUC BIV–46, figured in Chemnitz (1784: pl. 66 fig. 632); paralectotype (rv) ZMUC BIV–47, “Mari rubro” (Red Sea). Both valves in Spengler collection (now ZMUC). *Pecten aurantius*: Lectotype (Dijkstra, 1995) MNHN, “l’Océan indien?”. *Pecten florens*: Holotype MHNG 1088/70, “l’Océan indien?”. *Pecten indicus*: Type material not seen (repository unknown). *Pecten pseudolima*: 3 syntypes BMNH 1950.11.14.54–56, Jacna, Bohol, Philippines. *Pecten layardi*: 6 syntypes BMNH 1994.162, “Ceylon” (Sri Lanka). *Pecten fricatus*: Holotype BMNH 1994.161, locality unknown. *Pecten blandus*: 5 syntypes BMNH 1950.11.14.13–17, Australia. *Pecten raffrayi*: Holotype MNHN, Zanzibar. *Mimachlamys ellochena*: Holotype AMS C.119511, G.B.R. stn XVII, off Shaw Islands, Whitsunday Group, Queensland, 37 m. *Chlamys (Mimachlamys) asperrimoides*: Holotype AIM TM.1235, CS “Recorder”, S of Norfolk Island, from cable, 82–91 m; paratype, ZMUC, “Galathea” stn 674, 29°15’S, 177°57’W, off Raoul Island, Kermadec Islands, 75–85 m.

Other material examined: LORD HOWE ISLAND: P114, 31°23.9’S, 159°05.4’E, alive, 85–80 m (NZOI, 1 pr); P106, 31°27.7’S, 159°02.6’E, 53 m (NZOI, 1 v); P104, 31°30.0’S, 159°10.0’E, 75–72 m (NZOI, 2 v); P111, 31°37.6’S, 159°12.4’E, alive, 57 m (NZOI, 1 pr); P82, 31°49.8’S, 159°19.7’E, 78–84 m (NZOI, 1 pr). NORFOLK ISLAND: 1.5 miles SW of Anson Bay, 33–37 m, C.S. “Matai” (NMNZ M.243283, 4 pr & 1 v); I75, 28°45.0’S, 167°55.2’E, alive, 70 m (NZOI, 8 pr & 6 v); P28, 28°49.8’S, 167°59.6’E, alive, 53 m (NZOI, 4 pr & 3 v); AUZ026, 28°50’S, 168°03’E, NE of Norfolk I., 55 m, R.N.Z.F.A. “Tui” (NMNZ M.224615, 2 v); AUZ023, 28°51’S, 168°05’E, NE of Norfolk I., 66 m, R.N.Z.F.A. “Tui” (NMNZ M.223529, 18 v); AUZ027, 28°53’S, 168°03’E, NE of Norfolk I., 46 m, R.N.Z.F.A. “Tui” (NMNZ M.223538, 1 v); AUZ022, 28°53’S, 168°07’E, NE of Norfolk I., 95–104 m, R.N.Z.F.A. “Tui” (NMNZ M.223563, 5 v); AUZ028, 28°54’S, 167°59’E, N of Norfolk I.,

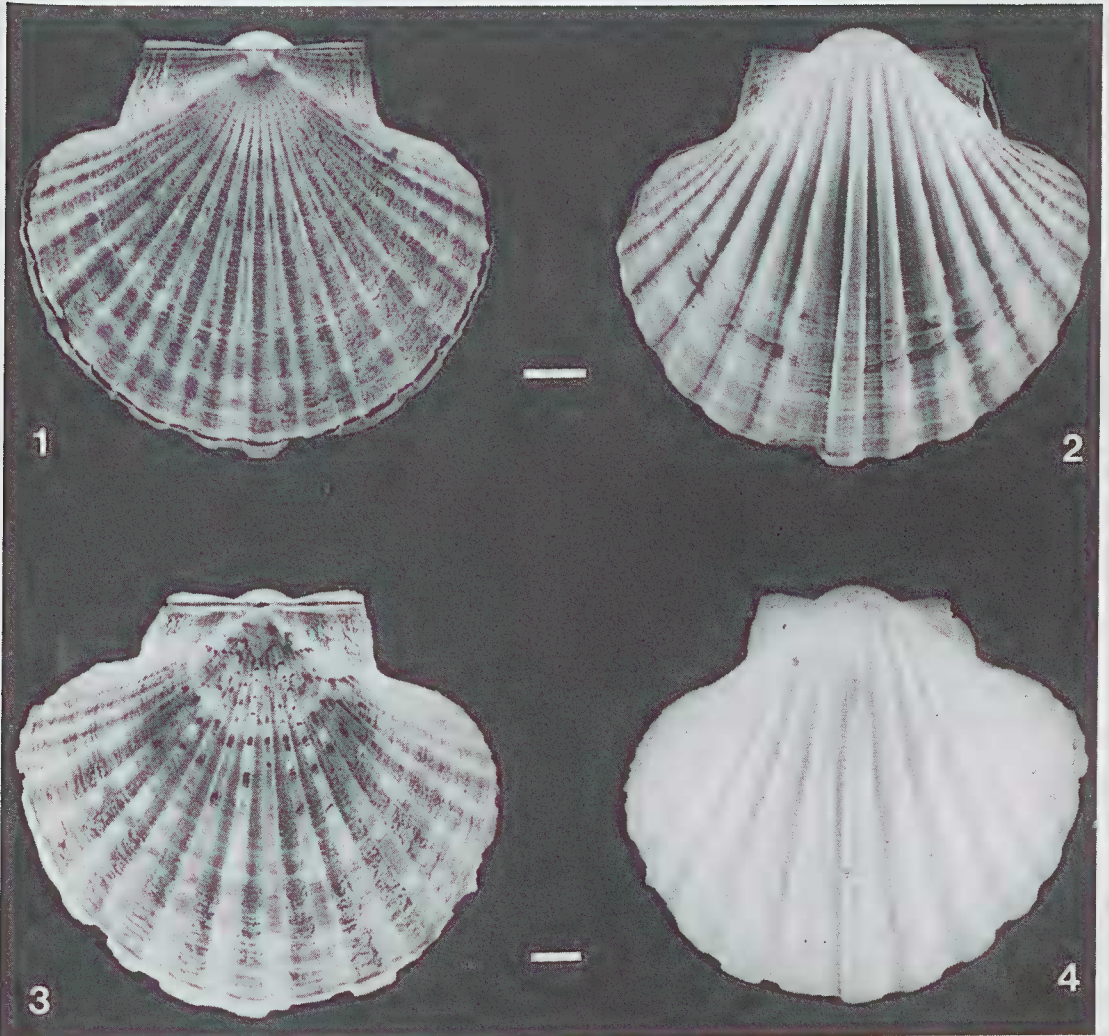


Plate 13. Figures 1–2. *Pecten fumatus* Reeve, 1852, Lord Howe Island, 53 m, NZOI stn P106. Figs. 1–2 (scale = 10 mm). Fig. 1. Left valve, exterior. Fig. 2. Right valve, exterior. Figures 3–4. *Pecten raoulensis* Powell, 1958, Kermadec Islands, 110–121 m, NMNZ M.222134. Figs. 3–4 (scale = 10 mm). Fig. 3. Left valve, exterior. Fig. 4. Right valve, exterior.

33 m, R.N.Z.F.A. "Tui" (NMNZ M.224554, many v); I74, 28°54.9'S, 167°55.5'E, 44 m (NZOI, 17 v); AUZ29, 28°56'S, 167°58'E, N of Norfolk I., 38 m, R.N.Z.F.A. "Tui" (NMNZ M.224926, 28 v); AUZ030, 28°59'S, 167°58'E, N of Norfolk I., 38 m, R.N.Z.F.A. "Tui" (NMNZ M.225103, many v); I73, 29°00.2'S, 168°00.8'E, 51 m (NZOI, > 50 v); I72, 29°04.4'S, 168°01.0'E, 55 m (NZOI, 12 v); I81, 29°06.0'S, 167°56.3'E, alive, 37 m (NZOI, 12 pr & > 50 v); I80, 29°06.8'S, 167°56.7'E, 34 m (NZOI, 1 v); I82, 29°07.7'S, 168°00.3'E, alive, 51 m (NZOI, > 50 pr & > 50 v); I84, 29°07.8'S, 168°09.9'E, alive, 65 m (NZOI, > 100 pr & > 50 v); I71, 29°09.8'S, 168°02.1'E, 57 m (NZOI, > 50 v); P36, 29°10.2'S, 168°09.5'E, 76–80 m (NZOI, 15 v); AUZ36, 29°19'S, 168°07'E, off Norfolk I., 110 m, R.N.Z.F.A. "Tui" (NMNZ M.224931, 44 v); AUZ037, 29°20'S, 168°09'E, E of Norfolk I., 201 m, R.N.Z.F.A. "Tui" (NMNZ M.224719, many v); I90, 29°25.0'S, 168°05.6'E, alive, 71 m (NZOI, 18 pr & > 100 v); P21, 29°31.8'S, 167°59.2'E, alive, 52 m (NZOI, 2 pr & 18 v); P19,

29°33.6'S, 168°01.6'E, 81–80 m (NZOI, 17 v); P18, 29°34.60'S, 168°03.00'E, 90 m (NZOI, 1 v). KERMADEC ISLANDS: K829, 29°13.00'S, 177°52.40'W, 610 m (NZOI, 1 v); T225, 29°13.10'S, 177°53.50'W, 472 m (NZOI, fragment).

Distribution: Throughout the tropical and subtropical Indo-West Pacific; 0–610 m, living at 37–71 m.

Remarks: As indicated by the synonymy, many names are used in literature for this species, and it is often confused with superficially similar species, such as *M. gloriosa* (Reeve, 1853) and *M. nobilis* (Reeve, 1853). Shells are often covered with sponges (Dijkstra, 1993: 12).

Specimens from the Kermadec Islands and Norfolk Island correspond very well with the type specimen of *M. senatoria*, although they have slightly more strongly lamellate scales on the primary and secondary radial costae, especially when covered by sponges. This phenomenon, however, is frequently observed in other species of *Mimachlamys*, and in *Chlamys* and *Zygochlamys*.

Genus *Talochlamys* Iredale, 1929

Talochlamys Iredale, 1929: 164. Type species (by original designation): *Chlamys famigator* Iredale, 1925; Recent, off New South Wales, Australia.

Remarks: Species of *Talochlamys* differ from *Mimachlamys* Iredale, 1929 by attaining smaller size, by being more weakly convex, and in having irregularly spaced radial costae, and interstitial concentric lamellae. Moreover, the secondary radial riblets are weaker and less regularly developed, while there are fine grooves on the anterior and posterior margins. In some specimens, however, the sculpture may be interrupted and followed by a sculpture similar to that in *Mimachlamys*. See also Beu (1995: 17).

Talochlamys sp. cf. *pulleineana* (Tate; 1887)

Pecten pulleineanus Tate, 1887: 73, pl. 4, figs. 1a–b.

Chlamys antiaustralis Hedley, 1911: 96 (partly); 1917: M8 (not *Pecten antiaustralis* Tate).

Chlamys famigator Iredale, 1925: 252–253, pl. 41, figs. 1–2.

Mimachlamys famigator (Iredale). Cotton & Godfrey, 1938: 100–102, fig. 88; Cotton, 1961: 107–107, fig. 92; Iredale & McMichael, 1962: 11; Lamprell & Whitehead, 1992: text unpag., pl. 9, fig. 53.

Belchlamys atkinos [sic] (Petterd). Cotton, 1961: 101 (not *Pecten aktinos* Petterd).

Camptonectes famigator (Iredale). Macpherson & Gabriel, 1962: 302, figs. 343, a.

Chlamys (*Talochlamys*) *famigator* Iredale. Rombouts, 1991: 34.

Talochlamys pulleineana (Tate). Beu, 1995: 17.

Type data: *Pecten pulleineanus*: Holotype (rv) SAM D.14171, “South-East coast” (of Australia). *Chlamys famigator*: Syntypes (1 lv, 1 rv) AMS C.53767, off Green Cape, southern New South Wales, 91–128 m.

Other material examined: NORFOLK RIDGE: BS891 (0637), 32°39.2'S, 167°31.7'E, Wanganella Bank, 133 m, R.V. “Tangaroa” (NMNZ M.243282, 3 v).

Distribution: Norfolk Ridge, New South Wales, Victoria, Tasmania, South Australia and Western Australia; 73–1000 m, living at 128–586 m.

Remarks: Cotton (1961) treated *Talochlamys pulleineanus* as a junior synonym of *Chlamys aktinos*

Table 1. Pectinoidea of Lord Howe Island (LH), Norfolk Island (N) and Kermadec Islands (K).
(o = taken alive; + = taken dead; - = no records)

Species	LH	N	K
1. <i>Propeamussium alcocki</i>	-	+	-
2. <i>P. maorium</i>	-	+	o
3. <i>P. rubrotinctum</i>	-	+	-
4. <i>P. sibogai</i>	-	-	+
5. <i>Parvamussium cristatellum</i>	-	-	+
6. <i>P. retiaculum</i>	-	+	+
7. <i>P. squalidulum</i>	-	-	o
8. <i>P. vesiculatum</i>	-	o	-
9. <i>Cyclochlamys lemchei</i>	-	-	o
10. <i>Cyclopecten horridus</i>	-	-	o
11. <i>C. kapalae</i>	-	-	o
12. <i>C. kermadecensis</i>	-	-	o
13. <i>Amusium balloti</i>	-	+	-
14. <i>Hemipecten forbesianus</i>	-	+	-
15. <i>Delectopecten musorstomi</i>	-	+	-
16. <i>Chlamys coruscans coruscans</i>	+	o	o
17. <i>Mimachlamys senatoria</i>	o	o	o
18. <i>Talochlamys</i> sp. cf. <i>pulleineanus</i>	-	+	-
19. <i>Annachlamys iredalei</i>	o	o	o
20. <i>A. kuhnholzii</i>	o	-	-
21. <i>Cryptopecten bullatus</i>	+	+	o
22. <i>Cryptopecten nux</i>	+	-	-
23. <i>Pecten fumatus</i>	o	-	-
24. <i>Pecten raoulensis</i>	-	-	o

(Petterd, 1886). From examination of type material, however, we conclude that *T. pulleineanus* is a senior synonym of *C. famigerator*, and that *C. aktinos* is a distinct species. *C. aktinos* differs in having shagreen microsculpture instead of radial scratches. The specimens from the Norfolk Ridge closely resemble Australian species of *T. pulleineanus*, but differ in having finer, more widely spaced radial costae, and finer, more closely spaced interstitial concentric lamellae.

Tribus Aequipectinini Nordsieck, 1969

Genus *Cryptopecten* Dall, Bartsch & Rehder, 1938

Cryptopecten Dall, Bartsch & Rehder, 1938: 84, 93. Type species (by original designation): *Cryptopecten alli* Dall, Bartsch & Rehder, 1938 (junior synonym of *Pecten (Chlamys) bullatus* Dautzenberg & Bavay, 1912); Recent, Hawaii Islands.

Corymbichlamys Iredale, 1939: 347, 367. Type species (by original designation): *Chlamys corymbiatus* [sic] Hedley, 1909 (junior synonym of *Pecten nux* Reeve, 1853); Recent, off Hope Islands, Queensland.

Cryptopecten bullatus (Dautzenberg & Bavay, 1912)

Plate 12, figs. 1-5

Pecten (Chlamys) bullatus Dautzenberg & Bavay, 1912: 17-18, pl. 27, figs. 1-2.

- Chlamys (Aequipecten) tissotii* (Bernardi). Kuroda, 1932: app. 95 (not Bernardi, 1861).
- Cryptopecten alli* Dall, Bartsch & Rehder, 1938: 93–94, pl. 23, figs. 1–4, 7; Poutiers, 1981: 332; Abbott & Dance, 1982: 308, holotype figured; Dijkstra, 1987: 8, fig.
- Chlamys bullatus* (Dautzenberg & Bavay). Barnard, 1964: 429–430, fig. 14c.
- Cryptopecten tissotii* (Bernardi). Habe, 1951: 77; 1964b: 174, pl. 53, fig. 8; Okutani, 1972: 113, fig. 62; Habe, 1977: 84; Koyama et al., 1981: 67 (not Bernardi, 1861).
- Cryptopecten complanus* Wang, 1983a: 402–403, 405–406, figs. 1.1–7.
- Cryptopecten bullatus* (Dautzenberg & Bavay). Hayami, 1984: 96–99, pl. 1, figs. 1–6, pl. 2, figs. 1–3, pl. 9, fig. 1, pl. 10, fig. 3, pl. 11, fig. 3; Wagner, 1989: 60–61, figs. 14–16; Dijkstra, 1991: 4, 35–36; 1992: 26–28, figs.; 1995: 51, figs. 115–118.
- Chlamys alli* (Dall, Bartsch & Rehder). Earle, 1985: 1, 4, 5, figs.
- Chlamys (Cryptopecten) bullatus* (Dautzenberg & Bavay). Rombouts, 1991: 23–24, pl. 23, fig. 6.

Type data: *Pecten (Chlamys) bullatus*: Holotype ZMA Moll.3.12.006, "Siboga" stn 105, 6°8'N, 121°19'E, Sulu Archipel, 275 m. *Cryptopecten alli*: Holotype USNM 173194, "Albatross" stn 3811, S coast of Oahu, Hawaiian Islands, 435–461 m. *Cryptopecten complanus*: Holotype IOAS M11072, 31°05'N, 128°00'E, East China Sea, 147 m.

Other material examined: LORD HOWE ISLAND: Q67, 29°30.5'S, 159°03.3'E, 350–437 m (NZOI, 1 v). NORFOLK ISLAND: AUZ036, 20°19'S, 168°07'E, off Norfolk I., 110 m, R.N.Z.F.A. "Tui" (NMNZ M.224931, 2 v); AUZ037, 20°20'S, 168°09'E, off Norfolk I., 201 m, R.N.Z.F.A. "Tui" (NMNZ M.224719, 19 v); I94, 29°20.2'S, 168°10.8'E, 308 m (NZOI, 6 v); P16, 29°36.3'S, 168°05.0'E, 310 m (NZOI, 1 v); P48, 28°42.8'S, 167°54.6'E, 279–186 m (NZOI, 2 v). KERMADEC ISLANDS: AUZ113, off Curtis I., 302 m, R.N.Z.F.A. "Tui" (NMNZ M.224642, 1 v); BS307, between Bell's Flat and Hutchison Bluff, Raoul I., alive, 110–146 m, R.V. "Acheron" (NMNZ M.222112, 1 pr); BS437, 29°11.9'S, 177°56.2'W, NW of Fleetwood Bluff, Raoul I., alive, 154 m, R.V. "Acheron" (NMNZ M.225419, 1 pr & 2 v); BS434, 29°12.7'S, 177°56.1'W, NW of Fleetwood Bluff, Raoul I., alive, 135 m, R.V. "Acheron" (NMNZ M.225425, 1 pr & 11 v); K816, 29°13.04'S, 177°55.5'W, 22–80 m (NZOI, 1 v); BS438, 29°14.7'S, 177°49.4'W, SE of Nugent I., Raoul I., alive, 146–165 m, R.V. "Acheron" (NMNZ M.225723, 2 pr & 24 v); BS570, 29°14.73'S, 177°50.34'W, E of Dayrell I., Herald Is., alive, 135–146 m, R.V. "Acheron" (NMNZ M.226627, 5 pr & 7 v); BS441, 29°15.5'S, 177°50'W, E of Chanter Is., Raoul I., 366–402 m, R.V. "Acheron" (NMNZ M.225506, 6 v); K803, 29°16.0'S, 177°50.3'W, alive, 140 m (NZOI, 1 pr); BS572, 29°18.9'S, 177°56.4'W, SE of Smith Bluff, Raoul I., alive, 82–100 m, R.V. "Acheron" (NMNZ M.27159, 2 pr & 3 v); K826, 28°48'S, 177°48'W, 142–160 m (NZOI, 1 v); K840, 30°17.6'S, 178°25.3'W, 398–412 m (NZOI, 1 v); K842, 30°10.2'S, 178°35.9'W, alive, 325–370 m (NZOI, 1 pr & 1 v); K856, 30°33.5'S, 178°31.1'W, 125–130 m (NZOI, 14 v); K875, 30°33.8'S, 178°30.6'W, 165–180 m (NZOI, 9 v).

Distribution: SW Indian Ocean, SE Africa, central and southern Japan, East China Sea, Philippines, Indonesia, E Australia, New Caledonia, Lord Howe Island, Norfolk Island, Kermadec Islands, Hawaiian Islands; 64–571 m, living at 82–461 m.

Remarks: Several Japanese authors have misidentified specimens of *C. bullatus* as *P. tissotii* Bernardi, 1858, but the type specimen of the latter (MNHN) is a juvenile *Aequipecten flabellum* (Gmelin, 1791) described from an unknown locality (off western Africa, det. Dijkstra – see also Hayami, 1984: 98). Poutiers (1981) identified a single right valve from northern Lubang, Philippines as *Cryptopecten alli*, but Hayami (1984) showed that *C. alli* and *C. bullatus* are identical in shell morphology and synonymized them. *C. complanus* Wang, 1983, based on material from East China Sea, is weakly differentiated from *C. bullatus* and is perhaps merely a local population.

Specimens from the Kermadec Islands and Norfolk Island are slightly more convex than the type

Table 2. Pectinoidea of Lord Howe Island, Norfolk Island and the Kermadec Islands in common to other regions. (I = Indonesia; NA = Northern Australia; EA = Eastern Australia; SEA = Southeastern Australia; SWA = Southwestern Australia; CS = Coral Sea; NC = New Caledonia; L = Loyalty Islands; V = Vanuatu; LH = Lord Howe Island; N = Norfolk Island; K = Kermadec Islands; NZ = New Zealand)

Species	I	NA	EA	SEA	SWA	CS	NC	L	V	LH	N	K	NZ
<i>Propeamussium alcocki</i>	x					x	x	x			x		
<i>P. maorium</i>											x	x	x
<i>P. rubrotinctum</i>	x						x	x			x		
<i>P. sibogai</i>	x	x					x	x	x				x
<i>Parvamussium cristatellum</i>	x												x
<i>P. retiaculum</i>							x				x	x	
<i>P. squalidulum</i>						x		x	x				x
<i>P. vesiculatum</i>							x	x			x		
<i>Cycloclamys lemchei</i>													x
<i>Cyclopecten horridus</i>							x	x					x
<i>C. kapalae</i>					x								x
<i>C. kermadecensis</i>													x
<i>Amusium balloti</i>	x			x	x	x	x				x		
<i>Hemipecten forbesianus</i>	x		x	x	x	x	x				x		
<i>Delectopecten musorstomi</i>	x						x				x		
<i>Chlamys coruscans</i>	x		x			x	x	x	x	x	x	x	
<i>Mimachlamys senatoria</i>	x	x	x			x	x			x	x	x	
<i>Talochlamys</i> sp.				x	x						x		
<i>Annachlamys iredalei</i>						x	x			x	x	x	
<i>A. kuhnholzii</i>			x			x	x			x			
<i>Cryptopecten bullatus</i>	x					x	x	x	x	x	x	x	
<i>C. nux</i>	x		x			x	x			x			
<i>Pecten fumatus</i>			x	x	x					x			
<i>P. raoulensis</i>													x
	11	2	6	5	4	11	15	8	3	7	13	14	1

specimen of *C. bullatus*, but intermediate forms are common. The sculpture in this species is rather variable, the interstitial concentric lamellae ranging from strong to very weak, though there is complete integradiation between extremes both within and between populations.

Cryptopecten nux (Reeve, 1853)

Pecten coruscans (not Hinds). Reeve, 1853: sp. 143, pl. 32, fig. 143.

Pecten nux Reeve, 1853: note under sp. 149.

Pecten hastingsii Melvill, 1888: 279, pl. 2, fig. 7.

Pecten guendolena Melvill, 1888: 279, pl. 2, fig. 6.

Chlamys smithi G.B. Sowerby III, 1908: 18, pl. 1, figs. 6–7.

Chlamys corymbiatus Hedley, 1909: 423, pl. 36, figs. 1–4.

Corymbichlamys corymbiatus (Hedley). Iredale, 1939: 368.

Cryptopecten nux (Reeve). Habe, 1951: 77; 1961: 118, pl. 53, fig. 9; 1964b: 174, pl. 53, fig. 9; Dijkstra, 1991: 36–37; Lamprell & Whitehead, 1992: pl. 11, fig. 66.

Cryptopecten nux nux (Reeve). Hayami, 1984: 100–103, pl. 2 fig. 4, pl. 3, figs. 1, 2, pl. 9 figs. 2–5, pl. 12, figs. 1, 2.

Cryptopecten bernardi corymbiatus (Hedley). Dijkstra, 1988: 7–8, figs..

Cryptopecten bernardi nux (Reeve). Dijkstra et al., 1990: 9, 10, figs..

Chlamys (Cryptopecten) bernardi (Philippi). Rombouts, 1991: 23, pl. 23, figs. 3, 3a (not Philippi, 1851).

Type data: *Pecten nux*: Lectotype (designated by Wagner, 1989) BMNH 1950.11.14.52 and 2 paralectotypes (BMNH 1950.11.14.50–51), Panglao, Bohol, Philippines (designated by Wagner, 1989). *Pecten hastingsii*: Holotype NMW 1955.158.10, Japan. *Pecten guendolena*: Holotype NMW 1955.158.02, Mauritius. *Chlamys smithi*: Holotype BMNH 1908.5.30.63, Mauritius. *Chlamys corymbiatus*: 2 syntypes AMS C.27532, Hope Islands, northern Queensland, 9–18 m.

Other material examined: LORD HOWE ISLAND: H.M.A.S. "Kimbla" stn LH 1, 31°34.9'S, 159°0.3'E, 73 m (AMS C.300121, 2 v); H.M.A.S. "Kimbla" stn LH 2, 31°38.2'S, 159°3.6'E, 44 m (AMS C.300122, 2 v).

Distribution: Red Sea, Oman, Kenya, Seychelles, Mozambique, Malagasy, Mauritius, eastern South Africa, Andaman Islands, Japan, Taiwan, Philippines, Indonesia, eastern and northern Australia, Micronesia, Melanesia, Polynesia; 9–918 m, living at 30–240 m.

Remarks: Hayami (1984) discussed the natural history and evolution of *Cryptopecten*. Wagner (1989) resurrected *C. guendolena* from synonymy under *C. nux*, and treated *C. bernardi* from French Polynesia as another distinct species.

Discussion

In a biogeographic analysis of the Mollusca of the Kermadec Islands, Oliver (1915) recorded 34% as endemic (89 species). In a subsequent analysis Dell (1958) also found 34% (85 species) endemism. Fourteen pectinoidean species are now known from that area, of which 3 are endemic (*Chlamydella lemchei*, *Cyclopecten kermadecensis* and *Pecten raoulensis*)(21%). Ten species were taken alive and 4 were represented by shells only.

Thirteen species are here recorded from Norfolk Island (4 live, 9 dead; none endemic) and 7 species from Lord Howe Island (5 live, 2 dead; none endemic).

Of the 23 pectinoidean species now known from the these island groups, most are closely related to Indo-Pacific species (14 species, 59%), several to the Australian region (6 species, 26%) and one species to New Zealand (4%).

The pectinoidean composition of the Kermadec Islands, Norfolk Island and Lord Howe Island is:

	Kermadecs	Norfolk	Lord Howe
total	14 spp	13 spp	7 spp
endemic	3 (21%)	–	–
Indo-Pacific	8 (57%)	9 (69%)	4 (57%)
Australia	2 (14%)	3 (23%)	3 (43%)
New Zealand	1 (7%)	1 (8%)	–

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Literature cited

- Abbott, R. T. 1954. American seashells. Van Nostrand, New York.
- Abbott, R. T. & Dance, S. P. 1982. Compendium of seashells. Dutton, New York.
- Adams, A. & Reeve, L. A., 1848–1850. Mollusca. Pp. 1–87. In: Adams, A. The zoology of the voyage of the H. M. S. "Samarang". Adams, London.
- Adams, A. & Reeve, L. A. 1849. Description of a new genus of acephalous Mollusca, of the family Pectinacea, collected by Capt. Sir Edward Belcher during the voyage of H. M. S. "Samarang". Proceedings of the Zoological Society of London 1848, 16: 133–134.
- Allan, J. 1950. Australian shells, with related animals living in the sea, in freshwater and on the land. Georgian House, Melbourne.
- Alcock, A. 1902. A naturalist in Indian seas. Murray, London.
- Alcock, A. & Anderson, A. R. S., 1897. Illustrations of the zoology of the royal Indian marine surveying steamer "Investigator". Mollusca I, 6 pls.
- Angas, G. F. 1865. On the marine molluscan fauna of the province of South Australia: with a list of all the species known up to the present time; together with remarks on their habitats and distribution, etc. Proceedings of the Zoological Society of London 1865: 645–871.
- Angas, G. F. 1867. A list of species of marine Mollusca found in Port Jackson Harbour, New South Wales, and on the adjacent coasts, with notes on their habits &c. II. Proceedings of the Zoological Society of London 1867: 912–935.
- Barnard, K. H. 1964. Contributions to the knowledge of South African marine Mollusca 5. Lamellibranchiata. Annals of the South African Museum 47(3): 361–593.
- Barnard, K. H. 1969. Contributions to the knowledge of South African marine Mollusca. Supplement. Annals of the South African Museum 47(4): 595–661.
- Bavay, A. 1905. Espèces nouvelles du genre *Pecten* provenant de l'Indian Museum de Calcutta. Mémoires de la Société Zoologique de France 17: 186–190.
- Bernard, F. R., Cai, Y. Y. & Morton, B. 1993. Catalogue of the living marine bivalve molluscs of China. Hong Kong University Press, Hong Kong.
- Bernardi, M. 1858. Description d'espèces nouvelles. Journal de Conchyliologie 7: 90–92.
- Bernardi, M. 1860. Descriptions d'espèces nouvelles. Journal de Conchyliologie 8: 378–379.
- Bernardi, M. 1861. Description d'espèces nouvelles. Journal de Conchyliologie 9: 46–48.
- Beu, A. G. 1970. Descriptions of new species and notes on taxonomy of New Zealand Mollusca. Transactions of the Royal Society of New Zealand, Geology (Earth Sciences) 7: 113–136.
- Beu, A. G. 1995. Pliocene limestones and their scallops. Institute of Geological & Nuclear Sciences Monograph 10: 1–243.
- Bosc, L. A. G. 1802. Histoire naturelle des coquilles, contenant leur description, les moeurs des animaux qui les habitent et leurs usages. Crapelet, Paris.
- Bronn, H. G. 1831. Italiens Tertiär-Gebilde und deren organische Einschlüsse. Groos, Heidelberg.
- Chemnitz, J. H. 1784. Neues systematisches Conchylien-Cabinet 7. Raspe, Nürnberg.
- Chenu, J. C. 1843–53. Illustrations Conchyliologiques ou descriptions et figures de toutes les coquilles connues vivantes et fossiles, classées suivant le système de Lamarck. Fortin and Masson, Paris.

- Cotton, B. C. 1961. South Australian Mollusca. Pelecypoda. Hawes, Adelaide.
- Cotton, B. C. & Godfrey, F. K. 1938. The molluscs of South Australia 1. The Pelecypoda. Trigg, Adelaide.
- Cox, L. R. 1929. Notes on the Post-Miocene Ostreidae and Pectinidae of the Red Sea region, with remarks on the geological significance of their distribution. *Proceedings of the Malacological Society of London* 18: 165–209.
- Dall, W. H. 1908. Reports on the dredging operations off the west coast of central America to the Galapagos, to the west coast of Mexico and in the Gulf of California, [...]. *The Mollusca and the Brachiopoda. Bulletin of the Museum of Comparative Zoology, Harvard College* 43: 205–487.
- Dall, W. H. 1916. Diagnoses of new species of marine bivalve mollusks from the Northwest coast of America in the collection of the United States National Museum. *Proceedings of the United States National Museum* 52: 404.
- Dall, W. H., Bartsch, P. & Rehder, H. A. 1938. A manual of the recent and fossil marine pelecypod mollusks of the Hawaiian Islands. *Bernice P. Bishop Museum* 153: 1–233.
- Dautzenberg, P. & Bavay, A. 1904. Description d'un *Amusium* nouveau dragué par le Siboga dans la mer de Celebes. *Journal de Conchyliologie* 52: 207–211.
- Dautzenberg, P. & Bavay, A., 1912. Les Lamellibranches de l'expédition du Siboga. Partie Systématique. I. Pectinidés. *Monographie Siboga-Expédition* 53b: 127–167. Leiden.
- Dautzenberg, P. & Bouge, J. L. 1933. Les mollusques testacés marins des établissements français de l'Océanie. *Journal de Conchyliologie* 77: 426–428.
- Defrance, M. J. L. 1825. Peigne. Pp. 251–267. In: *Dictionnaire des sciences naturelles* 38. Paris.
- Dell, R. K. 1956. The archibenthal Mollusca of New Zealand. *Dominion Museum Bulletin* 18: 1–235.
- Dell, R. K. 1958. The marine Mollusca of the Kermadec Islands in relation to molluscan faunas in the south west Pacific. *Proceedings of the 8th Pacific Science Congress* 3: 499–503.
- Dell, R. K. 1962. Additional archibenthal Mollusca from New Zealand. *Record of the Dominion Museum* 4: 67–76.
- Dell, R. K. 1963. Archibenthal Mollusca from northern New Zealand. *Transactions of the Royal Society of New Zealand* 3(20): 205–216.
- Deshayes, G. P. 1832. Descriptions des espèces nouvelles découvertes ou rapportées par M. Bélanger. Pp. 410–411. In: *Bélanger, C. Voyage aux Indes Orientales [...]* 6. Bertrand, Paris.
- Deshayes, G. P. 1836. Peigne (*Pecten*). Pp. 128–174. In: *Lamarck, J. P. B. A. de M. de. Histoire naturelle des animaux sans Vertèbres*. 2nd ed. 7. Baillière, Paris.
- Dharma, B. 1992. Siput dan kerang Indonesia. *Indonesian Shells* 2. Hemmen, Wiesbaden.
- Dijkstra, H. H. 1984. Les Pectinidae de N. Calédonie. The Pectinidae of New Caledonia. 4. *Chlamys coruscans coruscans* (Hinds, 1845). *Rossiniana* 23: 9–10.
- Dijkstra, H. H. 1986. Les Pectinidae de N. Calédonie. The Pectinidae of New Caledonia. 10. *Annachlamys kuhnholtzi* (Bernardi, 1860). *Rossiniana* 30: 19, 21.
- Dijkstra, H. H. 1987. *Cryptopecten alli*. *Hawaiian Shell News* 35(6), N.S. 330: 8.
- Dijkstra, H. H. 1988. Les Pectinidae de N. Calédonie. The Pectinidae of New Caledonia. 16. *Amusium balloti* (Bernardi, 1861). *Rossiniana* 38: 3–4.
- Dijkstra, H. H. 1989a. Les Pectinidae de N. Calédonie. The Pectinidae of New Caledonia. 20. *Annachlamys iredalei* (Powell, 1958). *Rossiniana* 42: 19–20.
- Dijkstra, H. H. 1989b. Les Pectinidae de Polynésie Française (exposé préliminaire). Pectinidae from French Polynesia (a preliminary report). *Xenophora* 48: 11–19.
- Dijkstra, H. H. 1990a. Three new pectinacean species from the Indonesian Archipelago collected during the Siboga expedition (1899–1900). *Beaufortia* 40: 1–14.
- Dijkstra, H. H. 1990b. A new species of scallop from off New South Wales, Australia (Bivalvia: Propeamussiidae). *Journal of the Malacological Society of Australia* 11: 29–32.
- Dijkstra, H. H. 1991. A contribution to the knowledge of the pectinacean Mollusca (Bivalvia: Propeamussiidae: Entoliidae; Pectinidae) from the Indonesian Archipelago. *Zoologische Verhandelingen* 271: 1–57.
- Dijkstra, H. H. 1992. Les Pectinidae de N. Calédonie/ The Pectinidae of New Caledonia. 27. *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912). *Rossiniana* 54: 26–28.
- Dijkstra, H. H. 1993. Les Pectinidae de Nouvelle Calédonie. The Pectinidae of New Caledonia. 30. *Mimachlamys senatoria* (Gmelin, 1791). *Rossiniana* 57: 12–13.
- Dijkstra, H. H. 1995. Bathyal Pectinoidea (Bivalvia: Propeamussiidae, Entoliidae, Pectinidae) from New Caledonia and adjacent areas. Pp. 1–64. In: *Bouchet, P. (Ed.). Résultats des Campagnes MUSORSTOM, Volume 14, Mémoires du Muséum National d' Histoire Naturelle* 16: 9–73. Paris.
- Dijkstra, H. H., Richer de Forges, B., Clavier, J. & Lefort, Y. 1989–1990. Pectinidés des fonds meubles dans les lagons de N. Calédonie et de Chesterfield. Pectinidae found on the soft bottoms of the New Caledonian and Chesterfield lagoons. *Rossiniana* 45: 21–24, Part 1; *Rossiniana* 46: 3–10, Part 2; *Rossiniana* 47: 3–9, Part 3.

